ViewCast

Osprey®-240e/450e User Guide

AVStream Driver Version 4.2

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AVStream Driver Version 4.2
ViewCast Corporation
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UL STATEMENT

Underwriters Laboratories Inc. has not tested the performance or reliability of the security or signaling aspects of this product. UL has only tested for fire, shock and casualty hazards as outlined in UL's Standard for Safety UL 60950-1. UL Certification does not cover the performance or reliability of the security or signaling aspects of this product. UL MAKES NO REPRESENTATIONS, WARRANTIES OR CERTIFICATIONS WHATSOEVER REGARDING THE PERFORMANCE OR RELIABILITY OF ANY SECURITY OR SIGNALING RELATED FUNCTIONS OF THIS PRODUCT.

To maintain UL compliance, this product to be used only with UL Listed computers that include instructions for user installed accessories.

FCC NOTICE:

WARNING: Connections between this device and peripherals must be made using shielded cables in order to maintain compliance with FCC radio emission limits.

WARNING: Modifications to this device not approved by ViewCast Corporation could void the authority granted to the user by the FCC to operate the device.

The Osprey-240e Video Capture device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the computer into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

If the above measures are unsuccessful, please consult the dealer or manufacturer of your radio or television receiver, or speak with an experienced radio/TV technician.

The Osprey-450e Video Capture device described has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against

harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE: This reminder is provided to call to the CATV installer's attention Section 820-40 of the NEC, which provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

Shielded Cables: Connections between this device and peripherals must be made using shielded cables in order to maintain compliance with FCC radio emission limits.

Modifications: Modifications to this device not approved by ViewCast Corporation could void the authority granted to the user by the FCC to operate the device.

Note to CATV Installer: This reminder is provided to call to the CATV installer's attention Section 820-40 of the NEC, which provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

PRODUCT DISPOSAL INFORMATION

Dispose of this product in accordance with local and national disposal regulations (if any), including those governing the recovery and recycling of waste electrical and electronic equipment (WEEE).

RoHS Compliant: ViewCast Corporation is committed to compliance with the European directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, Directive 2002/95/EC, the RoHS directive.

RoHS COMPLIANT

For current RoHS statement, see www.viewcast.com.

TABLE OF CONTENTS

CHAPTER 1

Getting Started with Your Osprey-240e/450e Video Capture Card

System Requirements

Please note that the following system requirements relate to your Osprey® Capture card only. The video capture or encoding applications you use will likely require a much more powerful system than that which is listed below. Please consult your software documentation for applicable system requirements.

Minimum System Requirements:

Direct Mode: 600 MHz Intel® Pentium® 3 processor or equivalent

PostProcessing Mode and SimulStream®: 2 GHz Intel® Pentium® 4 processor or equivalent, 3 GHz recommended

Microsoft® Windows® XP Professional or Home Edition, Windows Server® 2003

Up to 7.5 MB of available hard disk space

256 MB of RAM, 512 MB recommended

One available PCI Express® slot

Installation Steps

In all cases, use the setup.exe program on the product CD or in the web package if you downloaded it. The setup program automates the Plug and Play steps needed to install the drivers and ensures that they are performed correctly. It also installs the bundled applets and User's Guide. If you have multiple Osprey capture cards in the system it configures all of the boards at the same time.

This is the method we recommend especially if Osprey software does reside on your host computer. After the install is run, the software detects the card and its drivers initiate automatically.

If updating Osprey software, then uninstall the previous software version, reboot your computer and install the update.

Installing the Osprey AVStream Driver

Insert the Osprey Software CD into your CDRom drive. The main menu for the Osprey software will appear if autoplay is enabled. If the main menu does not automatically appear, click on the Window's Computer Icon and select the CDRom and the setup.exe Icon. The "Osprey AVStream – Install Shield Wizard" will engage and will guide you through the installation process.

Custom Installing the AVStream Software

If, during the installation process, you choose a "Custom" installation, you will have some limited options. See the screen in Figure 1-1.

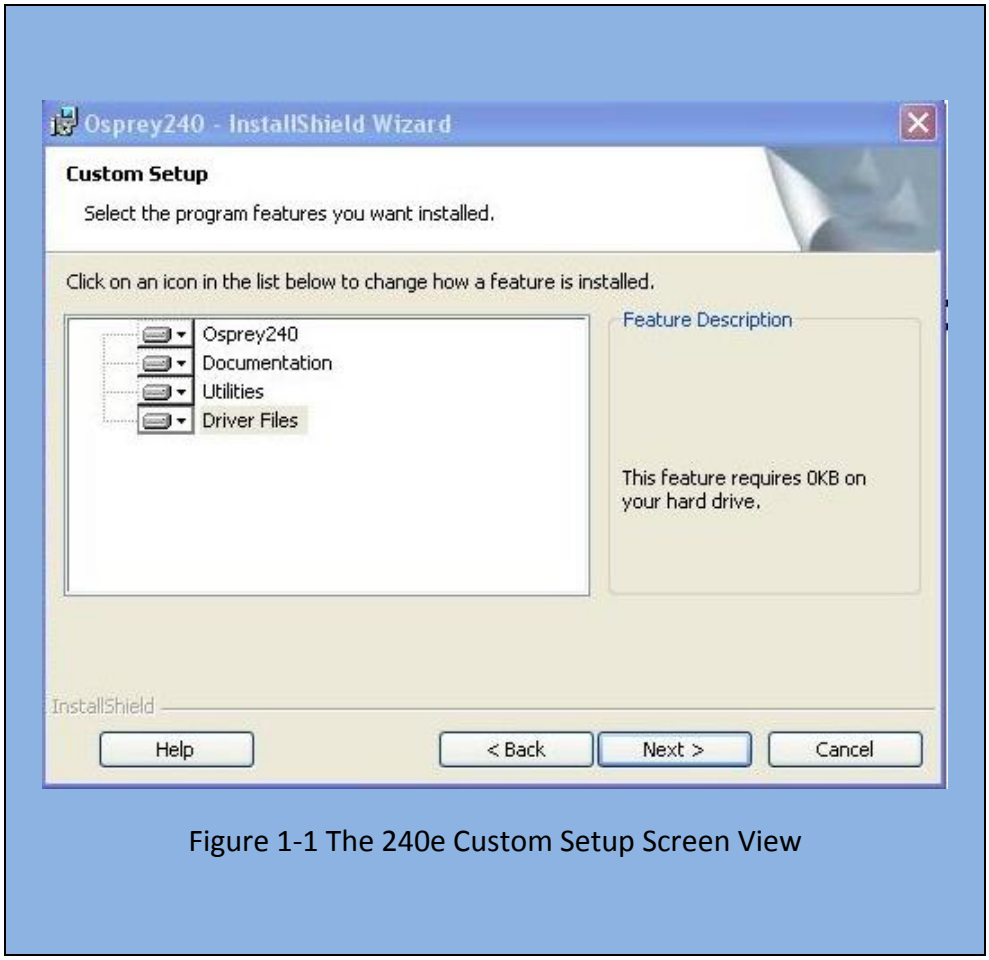

Figure 1-1 The 240e Custom Setup Screen View

This window will allow you to choose individual components you may want to install. You can also change the location where components will install.

Installing Your Osprey Video Capture Card

Multiple Board Types, and Adding or Moving Boards

This manual covers one class of Osprey devices that include two PCI Express cards.

class 6: o240, o450 and related non-DSP PCI Express products

Both cards use the same driver. If you add a card from a different class then you will need to install the driver for that card.

When you add or move boards after the AVStream 4.2 driver is already installed, there are two possibilities:

A: You add a board of a different class from what is already in the machine. For example, there is already an Osprey-240e in the machine with the current driver installed, and you want to add an Osprey-530. For this case you have to obtain and install the driver install package for the new board.

B: You move a board from one slot to another, or if you add another board of the same type. For example, you might have an Osprey-240e in the machine, and want to add another Osprey-240e. In this case, the following sequence will begin:

The New Hardware Wizard runs and displays the Found New Hardware window followed by the Digital Signature Not Found window. See Figure 1-2

Figure 1-2 Digital Signature Not Found Screen

1. Click Continue Anyway as we have tested our cards in thousands of PCs.
2. The Controller installing window displays, and the text inside this window changes to “Osprey Video Capture Device, Installing ....” Then the Digital Signature Not Found window appears on top of it.
3. Click Continue Anyway.. The Completing the Found New Hardware window displays.
4. Click Finish. The Digital Signature Not Found window displays.
5. This window displays once for each Osprey board you are installing. The Systems Setting Change window displays.
6. Click Finish and tell the system to restart now. (Figure 1-3).

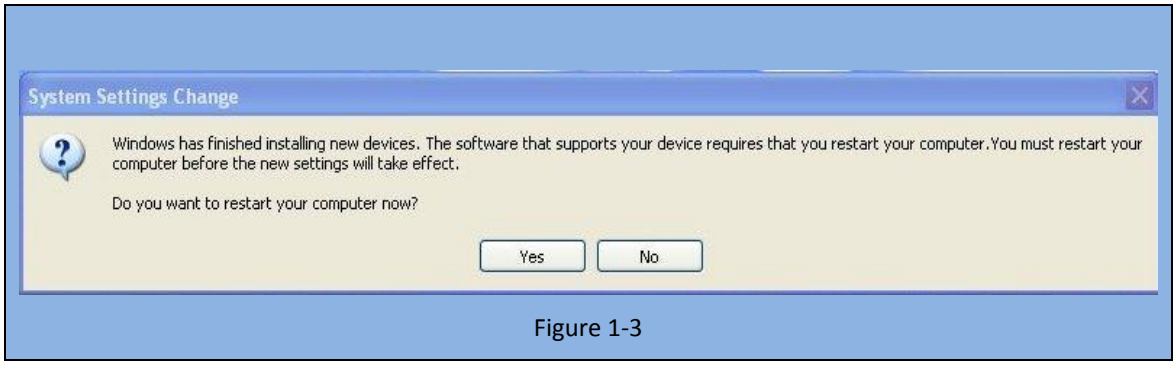

Figure 1-3

CHAPTER 2

Setting the AVStream Driver Properties for Osprey-240e/450e

Using the Osprey Config Utility

You bought your Osprey Card and installed it in the PCI Express (PCIe) slot on your computer. After installing the card and AVStream driver, you want to know how to access to the card's settings and possibly modify them to fit your needs. This manual will take you Step-by-Step through the card settings visually. We'll start by opening the Osprey Config utility (See Figure 2-1). Afterwards, we can explore the driver.

You will need to use a DirectShow application such as Microsoft Windows Media® Encoder or RealProducer®. We also access card property pages through Osprey Config, the utility bundled with our 4.2 driver suite. Once installed you can see the card's default settings and change them as needed.

To open Osprey Config select "All Programs" in the start menu of your Windows computer, then select the ViewCast Window Icon. Click the icon, select Osprey-240e and 450e, then Utilities and the Osprey Config icon becomes visible.

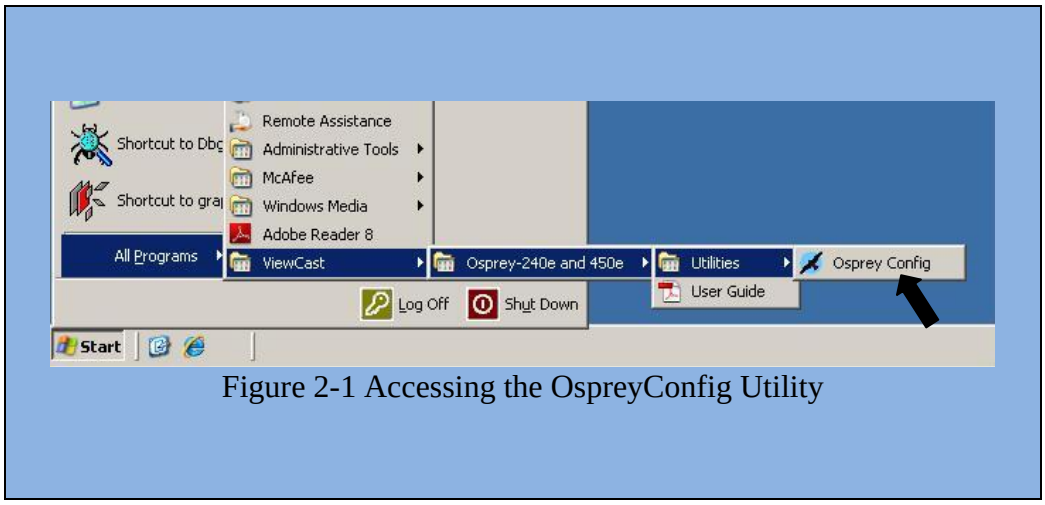

Figure 2-1 Accessing the OspreyConfig Utility

Tip: Other Direct Show applications can find the property page too. If you use a 3rd party application, you will find how to access the card's settings in the applications party documentation.

OspreyConfig's Initial Processing Sequence

Now, we're back to the Osprey Config utility. After clicking on the Osprey Config icon you will initially see the first screen of the application showing what cards and devices you or someone installed on your computer. Figure 2-2 depicts the initial screen.

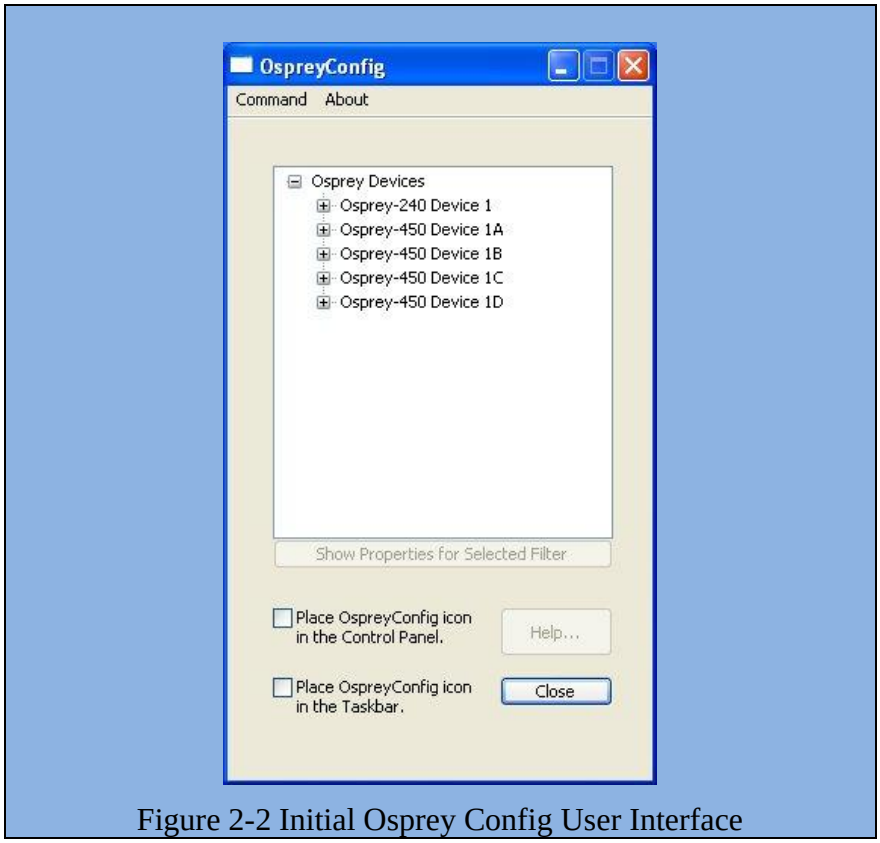

Figure 2-2 Initial Osprey Config User Interface

In Figure 2-2, you can see that the computer in use has two cards and five devices: The Osprey-240e and the Osprey-450e. Both cards can take a single input and stream its content differently, for example, you can use several, bit rates, sizes and formats. By clicking the "+" icon on the left side of the device you wish to configure, you can change the properties of that device.

Figure 2-3 shows the user interface that appears when you select a filter. We expanded the Osprey-450e Device 1A and selected Video Filter. We'll continue with this device unless we indicate otherwise.

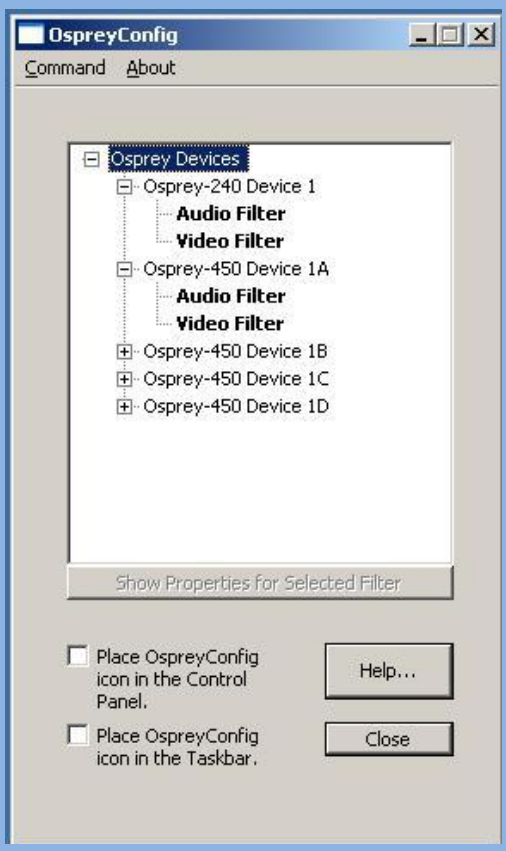

Figure 2-3 Selecting a Device for Configuration

When you choose Device1A and Video Filter (Fig 2-3) the "Show Properties for Selected Filter" becomes active. See Fig 2-4.

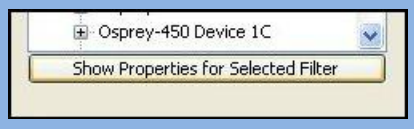

Figure 2-4 Control Used to Open the Properties Page

Understanding Osprey's Device Properties Window

Osprey's device properties window allows you to view and change the default settings of the 4.2 driver. If you familiarize yourself with the video card's properties you can learn to make changes to get the optimum performance from your card and change settings in real time.

Device properties are visible through tabs to select different controls. People who have used our video capture cards will find that the 4.2 driver includes changes from previous versions. The tabs have changed. They now take advantage of the 4.2 driver's advances and added functionality. Figure 2-5 provides a visual image of the Property Page a user will see as it appears using our Osprey Config utility.

Let's look at the tabs of device's property card. Figure 2-5 helps in gaining a grasp of the features and settings of the Osprey-240e and Osprey-450e series.

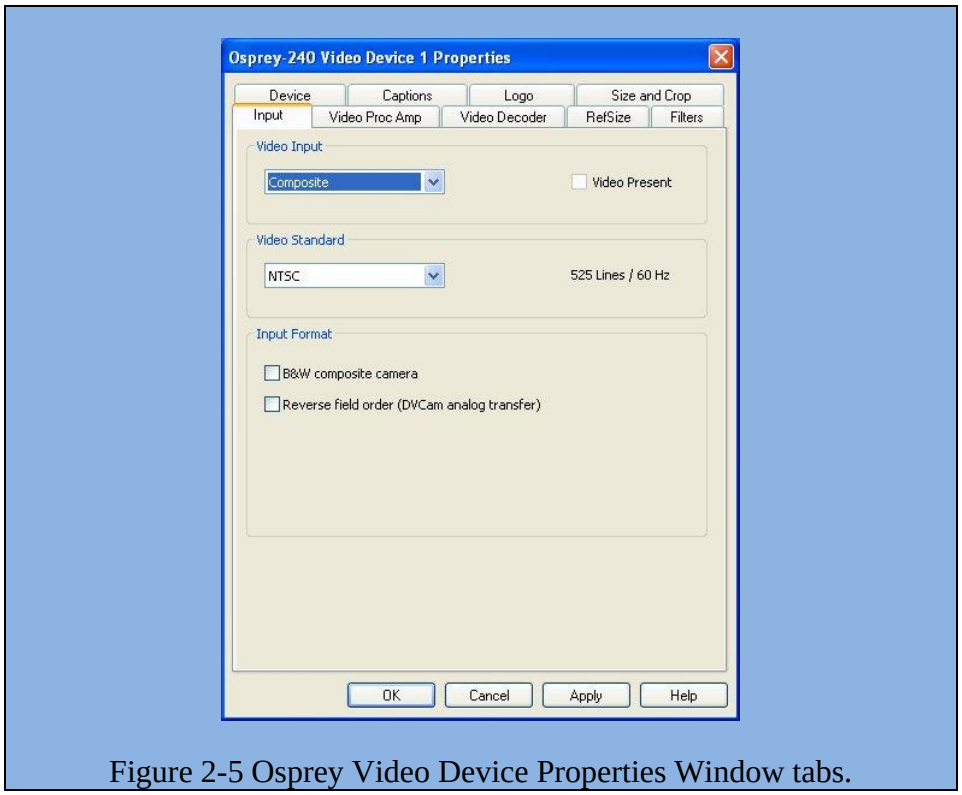

Figure 2-5 Osprey Video Device Properties Window tabs.

The Osprey-240e and Osprey-450e use the same driver. You will see the same Video Device properties whether you choose the Osprey-240e or the Osprey-450e. If you have other Osprey cards, they can still coexist on your PC, but they will use a separate version of the drivers provided with the card. You will need the driver version for Video Capture cards you utilize.

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Tab	**Functions**
Input	Select the video input, NTSC / PAL / SECAM video standard and Input Format
Video Proc Amp	Set brightness, contrast, saturation, hue, and sharpness
Video Decoder	Select the video standard – NTSC, PAL, SECAM
RefSize	Setting Horizontal format and delay, source width and so forth

Filters	SimulStream®, deinterlace, and inverse telecine*
Device	Test Pattern, Capture Buffers, Diagnostic Logging
Captions	Set up on-video closed caption rendering
Logo	Set up on-video logos
Size and Crop	Set the default size, enable cropping, set the cropping rectangle

Table 2-1

* Telecine refers to the technology used to transfer or repurpose analog film into electronic media.

Some of the 4.2 drivers' controls work interactively and changes in value immediately update the video. Examples include brightness, contrast, hue, saturation, and sharpness.

Devices and Global Controls

The Osprey-240e and Osprey-450e Video cards have the ability to present multiple output streams from a single input device. For example, a company may wish to do a webcast globally to resellers, users or potential customers. Using the Filters Tab, one can set up different output streams with different bit rates to accommodate users with different bandwidths.

Now, we need to address the effects of changes made on each channel. Some changes may affect the filter on which you work. These include cropping, logos and captions. Change those on the Osprey-450e Device 1A, Filter 2, for example, and they will only affect that filter. (See Figure 2-6).

Alter the values on Video Proc Amp, Video Decoder, Input, Filters, Device and/or RefSize tabs and the effect will become global to the card. All characteristics on each device on the card will change to those changed on a single device. This is limited to the card on which the device changed. If you make changes on an Osprey-240e card residing with an Osprey-450e card, a change on the Osprey-450e will not affect the Osprey-240e devices.

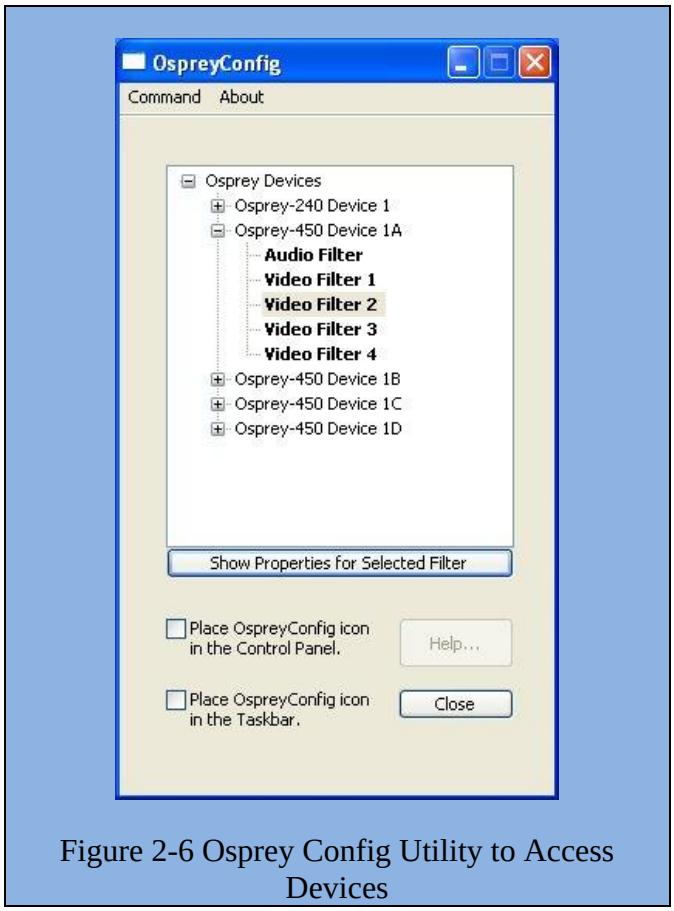


Figure 2-6 Osprey Config Utility to Access Devices

You will see reference to “pins and filters” in DirectShow® discussions. These terms require technical experience with Microsoft’s DirectX® 9 Software Developer’s Kit. References on tabs in the Osprey Driver relates to terms used by Microsoft’s streaming video software application. They exist for users with a high degree of technical expertise. You can simply ignore them and use the property tabs as discussed in this manual.

Section I

The Input Tab

The source of data an Osprey-240e/450e will stream to the Internet can come from a number of devices such as DVD players, digital cameras, Camcorders and so forth. The Video Input section of the tab allows you to select the Video input type coming from your source video. The Video Standard allows you to select the standard different countries or geographical areas use (See Figure 2-7). The North American standard is NTSC. The Japanese standard is NTSC-Japan. The five PAL standards, B, D, G, H, and I are very similar, and are treated the same way by the Osprey driver. The driver also supports SECAM video.

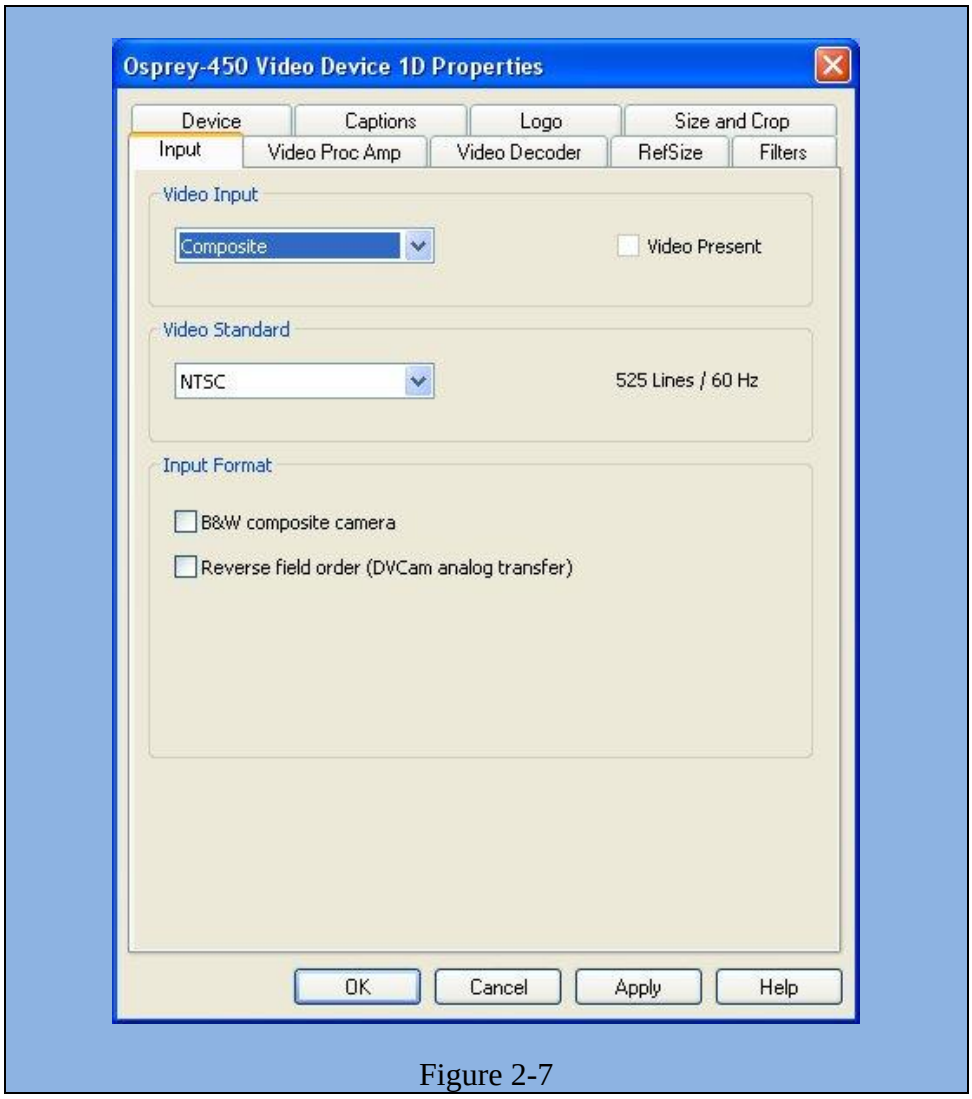


Figure 2-7

The controls on the Input tab of the driver properties card have a global effect on the Osprey capture card on which they reside. If you have multiple Osprey cards, and you want to make global changes, you have to do that on each card.

Osprey-450e A/V Option Hardware Add-on-Device

In addition to the standard components built into the Osprey-450e card, you can purchase the Osprey-450e A/V Option hardware add-on device**.**

The A/V Option exposes additional inputs for Component and S-Video as well as balanced audio. For example, when you choose a Filter from standard Osprey-450e Device 1A; the default option provides a single video capability: Composite.

2-8 Input Tab without A/V Option

Without the A/V hardware option the default input standard is limited to Composite. With the optional add-on, you also have Composite 1,2,3,4, S-Video and Component YRYBY (See Figures 2-8 and 2-9).

Tip: Separate video, abbreviated S-Video and also known as Y/C is an analog video signal that carries the video data as two separate signals. They include luma (~brightness) and chroma (~color).

Figure 2-9 Osprey-450e Card with Optional Plug-in

Input Format Group: Analog Inputs

Below the Video Standard drop down box you will see two check boxes for Input Format (Figure 2-10).

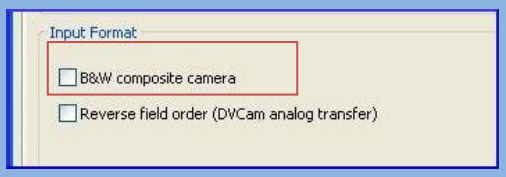


Figure 2-10 Check Box for Input Format

On the Osprey-240e/450e, when an analog input (components or S-Video) becomes the media source, the controls provide adjustments that improve the clarity of video from monochrome sources. When a composite input line is selected, and a monochrome device is attached the result will be a sharper image, as shown in the "notch kill" item in Figure 2-11. This control is only for true monochrome devices, without color capability

B&W composite camera

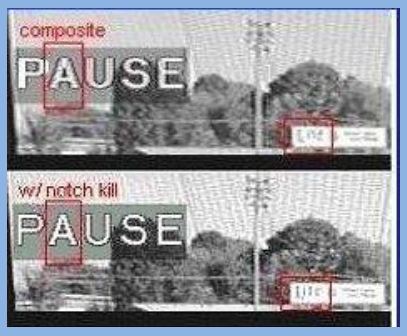


Figure 2-11

Black and white input sources are rare these days, but some do exist. For example, you may want to stream black and white historical film in a documentary film.

Reverse field order

This control works with digital cameras routing through the Osprey card's analog composite or S-Video input. The normal field pairing order for NTSC cameras is Odd-Even. However, some progressive video cameras and footage require pairing of even/odd frames. Refer to Figure 2-12. The Reverse field order can correct problems with interlaced video effects where alternate lines are reversed.

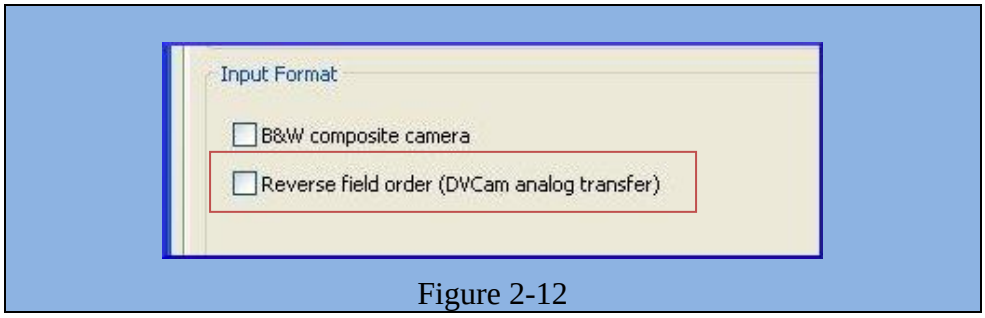

Input Format
B&W composite camera
Reverse field order (DVCam analog transfer)

Figure 2-12

Section II

The Video Proc Amp Tab

Video Proc Amp stands for Video Process Amplifier. It has the ability to control various characteristics of streaming output from Osprey-240e/450e cards. You can see in Figure 2-13 that the Video Proc Amp is the second tab from the left of the Device 1A properties.

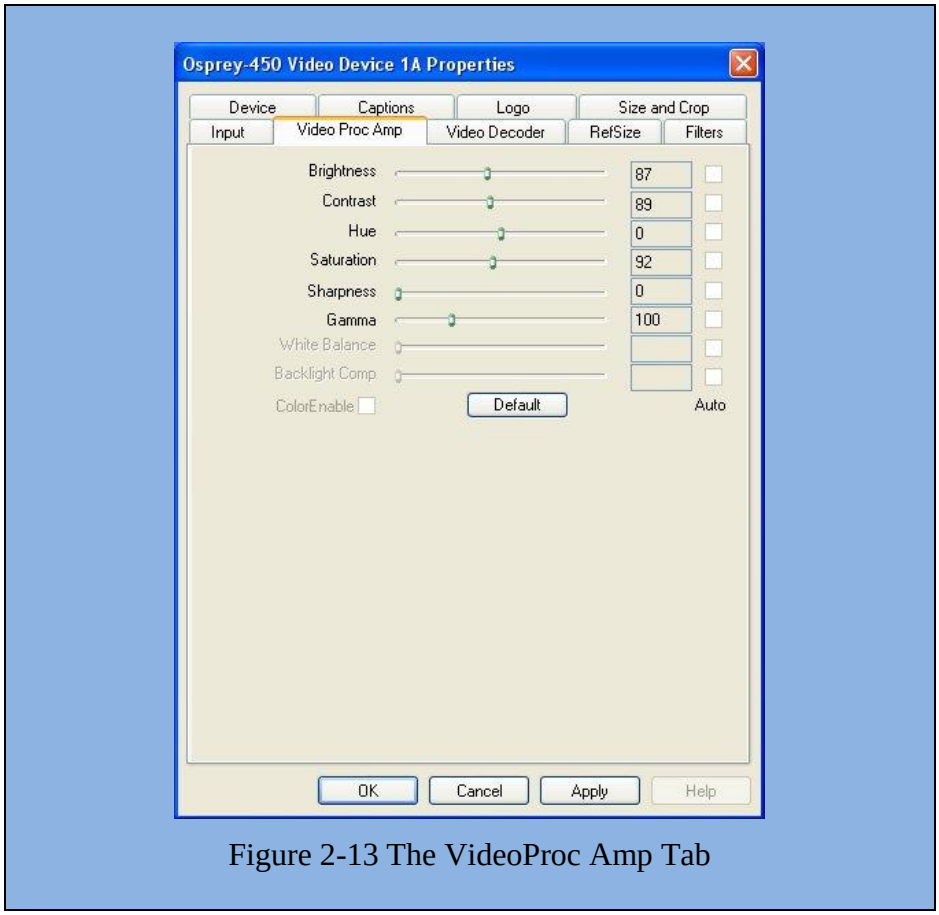


Figure 2-13 The VideoProc Amp Tab

The Video Proc Amp uses slider controls to adjust brightness, contrast, hue, saturation, sharpness and gamma. If you're using the preview or capture mode in real-time, then you can see your adjustments as you make them with the Video Proc Amp controls.

Figure 2-14 gives you a close-up view of the controls you can use. Table 2-2 explains the functions of each control.

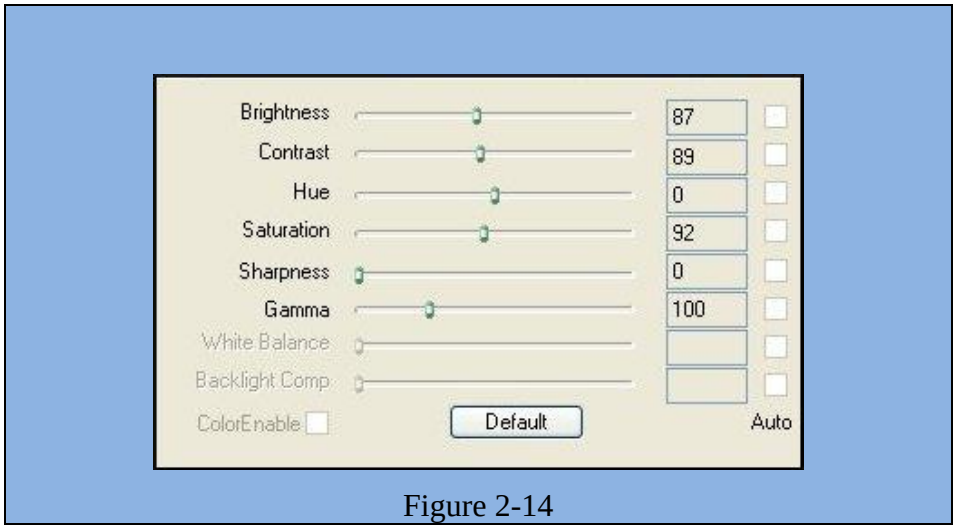


Figure 2-14

Brightness and Contrast	These are terms for what one would call a contrast ratio. It's a measure of a display system, defined as the ratio of the brightest color (white) to that of the darkest color (black) that the system is capable of producing. A high contrast ratio is a desired aspect of any display, but with the various methods of measurement for a system or its part, different measured values can sometimes produce similar results. The control exists in the event you need to change the ratio of an incoming signal.
Hue	Hue adjustment only functions for NTSC video.
Saturation	In color theory, saturation or purity refers to the intensity of a specific hue. A highly saturated hue has a vivid, intense color, while a less saturated hue appears more muted and grey. With no saturation at all, the hue becomes a shade of grey. You are able to adjust the saturation level in the event it is altered by a video feed.
Sharpness	This slider has eight positions corresponding to eight hardware filter settings. Generally, the positions to the left result in smoother video, the positions to the right result in sharper video. Since each step engages a different combination of discrete filters, some steps may result in slight differences while other steps may result in large differences. The range is 0 to 7.
Gamma	You would rarely use this control; however, a need may arise for its use. In the simplest terms the input of a feed from a device into your card may not match the digital output on your screen. The gamma control allows you to balance the red, blue and green from the input to output within the normal range of people's perceptions.

Table 2-2

Note: The grayed out features after gamma are not implemented on the Osprey cards. The driver does not implement White Balance and Backlight Comp controls, and the Auto checkboxes do not function because the driver does not implement automatic setting of the Proc Amp adjustments.

For all of the Video Proc Amp controls the driver maintains one settings per Osprey device. It does not maintain individual settings for each input or type of input.

When you change the video standard or input you will not see changes in the slider controls – such as the Hue button becoming disabled – until the driver properties dialog is closed and re-entered.

Section III

The Video Decoder Tab

The Video Decoder Tab is a Microsoft DirectShow standard control for setting the NTSC/PAL/SECAM video standards. We discussed NTSC while discussing the Input Tab in the early section of this manual. PAL and SECAM are standards used in Europe and other parts of the world. Your Osprey cards can function in computers in various countries with different standards. We depict the Video Decoder screen in Figure 2-15.

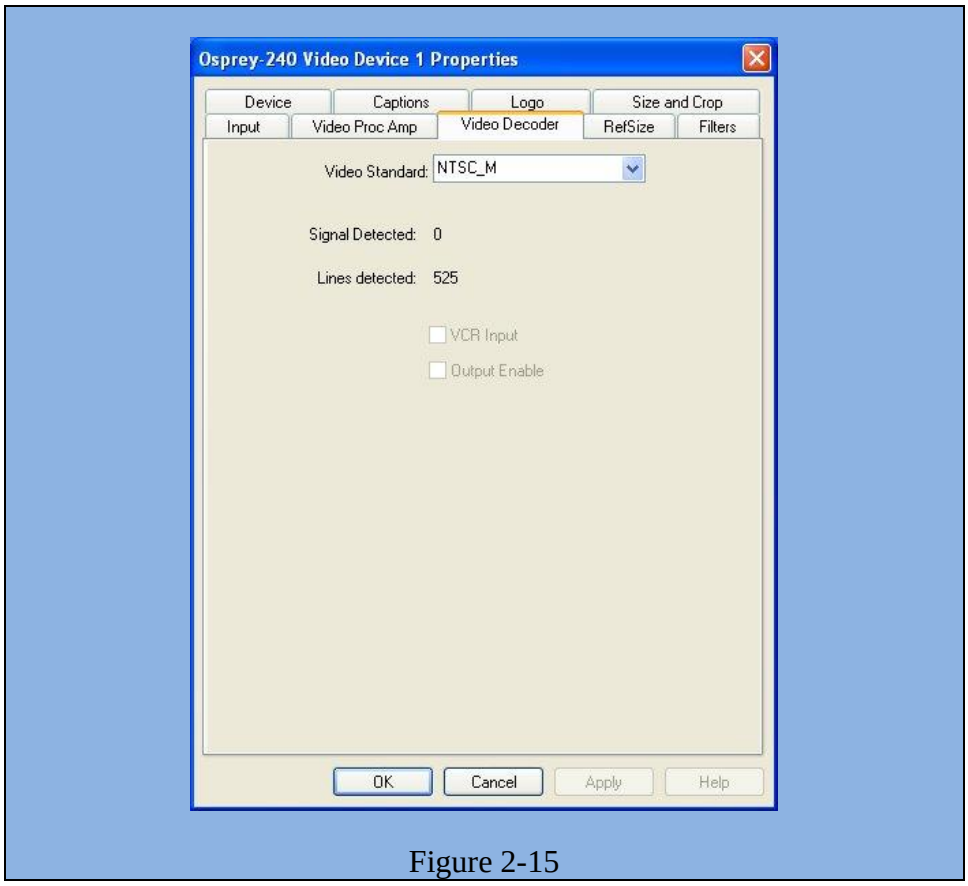


Figure 2-15

Changes apply to all video previews and stream captures on the currently selected device. If you have multiple Osprey cards, you can set the input individually for each of them. Changes made with this control take effect immediately. If video is running and a standard is selected that does not match the incoming signal, the video is likely to freeze or glitch until the signal matches the correct standard.

Section IV

The RefSize Tab

Changes made on this Tab (Figure 2-16) apply to all video previews and captures on the currently selected device. The RefSize tab controls, shows you the features related to the reference size, format, and proportions of the video. Most users can set up this page once and only refer to it on an occasional basis since this page does not provide everyday control for the final output size of your video. You'll likely control final output size from your application, the Crop tab, or from the Pin Properties dialog described in the next section.

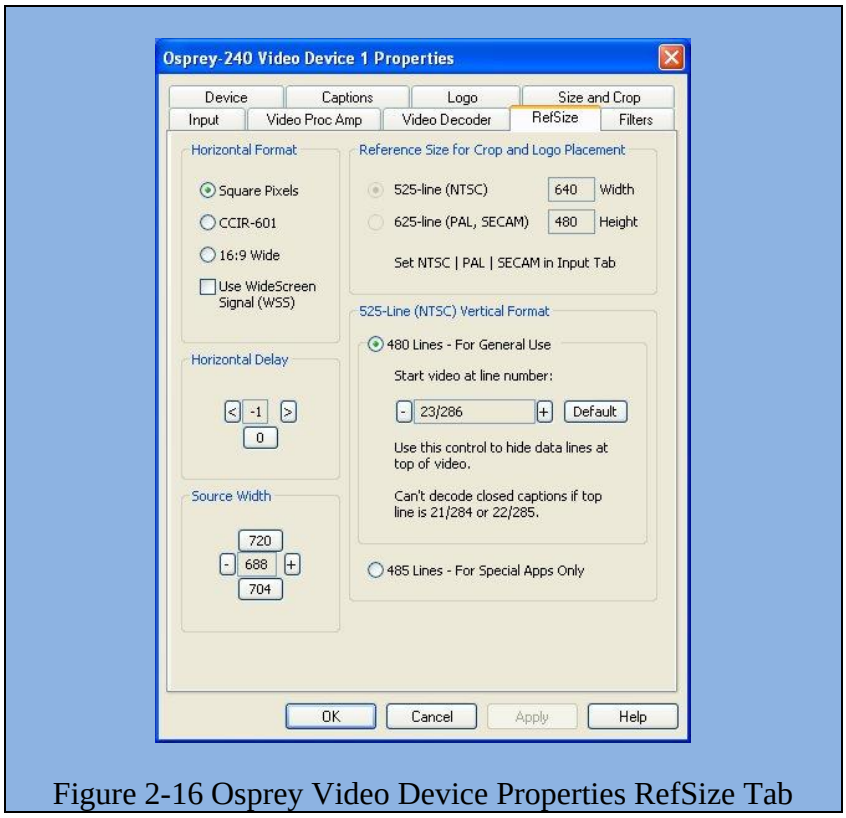


Figure 2-16 Osprey Video Device Properties RefSize Tab

- **Horizontal Format**
- **Horizontal Delay**
- **Source Width**
- **Reference Size for Crop and Logo Placement**
- **525-Line (NTSC) Vertical Format**

Horizontal Format

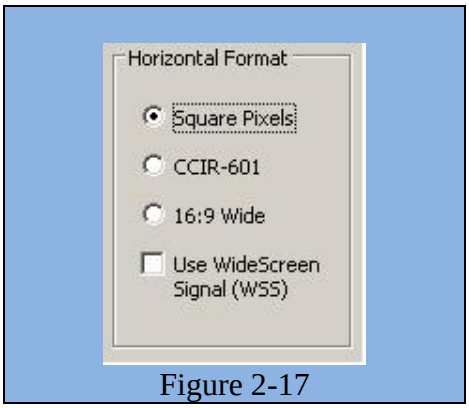


Figure 2-17

Use the Square Pixels setting for normal 4:3 video (Figure 2-17) that will be viewed via a computer monitor. This setting results in a square aspect ratio sampling of the source video. This results in a source image of 640x480 for 525-line standards and 768x576 for 625-line standards.

Use the CCIR-601 setting for 4:3 video that will be viewed on a dedicated video monitor. This setting results in a CCIR-601 aspect ratio sampling of the source video. It results in a video input horizontal size of 720 pixels for both 525-line and 625-line standards. This sizing is standard for dedicated monitors but results in video that appears horizontally stretched (525-line) or squeezed (625-line) on a computer monitor.

It is more efficient to set the horizontal mode to match the size of the output. For example, if your target video size is 640x480, using Square Pixel sizing in PostProcessing Mode will avoid an unnecessary software scaling step in the driver.

On some systems, for reasons external to this driver, 640x480 video will render on screen a lot faster than 720x480 video – that is, the speed difference will be a lot more than the 9:8 ratio of numbers of pixels.

Select 16:9 Wide for 1.85:1 anamorphic video such as DVD content and PAL widescreen content. The output video size will be 852x480 for 525-line standards, and 1024x576 for 625-line standards. In order to actually see output of this size you have to also select this size in your application.

The “Use WideScreen Signal (WSS)” control enables automatic sidebars and letterboxing when the input video aspect ratio does not match the output aspect ratio. If the aspect ratio of your content is subject to change between 16:9 and 4:3, it will be useful to the enable this control.

WSS is a line of the vertical blanking interval (VBI) that encodes the aspect ratio of the video. It is normally line 20 of 525-line video and line 22 of 625-line video. It is generated by newer DVD players, and is present in PAL broadcast content.

The “Use WideScreen Signal (WSS)” control is useful for both 4:3 and 16:9 input formats, and for both 4:3 and 16:9 output formats. When selected, it has the following effects:

- 4:3 video on a 4:3 window shows without sidebars or letterboxing
- 4:3 video on a 16:9 window shows with sidebars
- 16:9 video on a 16:9 window shows without sidebars or letterboxing
- 16:9 video on a 4:3 window shows with letterboxing

Horizontal Delay

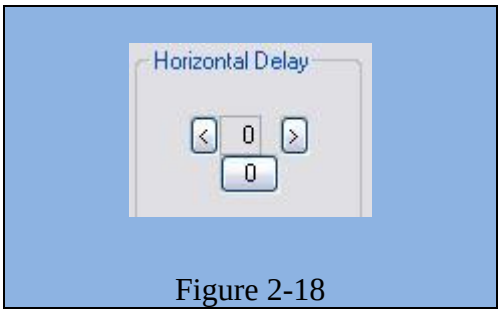


Figure 2-18

The Horizontal Delay control moves the video horizontally in the capture or preview frame. Video devices differ in their timing characteristics, so some devices may need different adjustments from other devices. Adjust this control if you are seeing a black line to the left or right of the video (Figure 2-18). Use the left and right arrow buttons to move the video to the left or right. Click [0] to restore the default zero setting. The allowed range is -12 to 11. With uncropped video, the video will shift only on every second increment 0, 2, 4….

Source Width

This control is available only on the Osprey-240e and Osprey-450e series board (Figure 2-19).

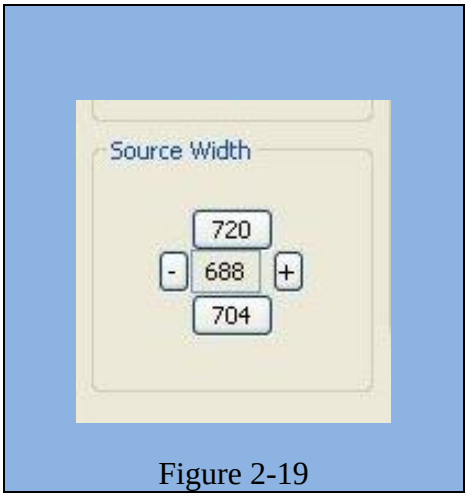


Figure 2-19

The Source Width control can be used to trim the black left and right edges of an image. This control is only available for NTSC video, and only when the Horizontal Format is set to Square Pixels such that the reference size is 640x480.

The suggested procedure is as follows:

1. With video preview running, click [720] to display the entire image, which will usually include black left and right edges. Changes will appear interactively.

2. Use the Horizontal Delay control immediately above this control to center them image so that the black edges are of equal width.

3. Click [704] to trim the image to the nominal borderless width.

4. Click [+] and [-] to adjust the trimmed size so that the black edges are completely removed but no active video is lost. The allowed range is 688 to 720.

It is possible to obtain the same result using the cropping control (Size and Crop Tab) but there are some differences.

1. The Source Width control affects all pins and all filters on the device, whereas the crop control would have to be set separately for all SimulStream filters.

2. In Post-processing Mode this operation is often more efficient in terms of processing than a crop operation. The crop and scale are done in hardware, so if you are using the resultant 640x480 image directly without further cropping there is no scale/crop processing cost incurred.

Reference Size for Crop and Logo Placement

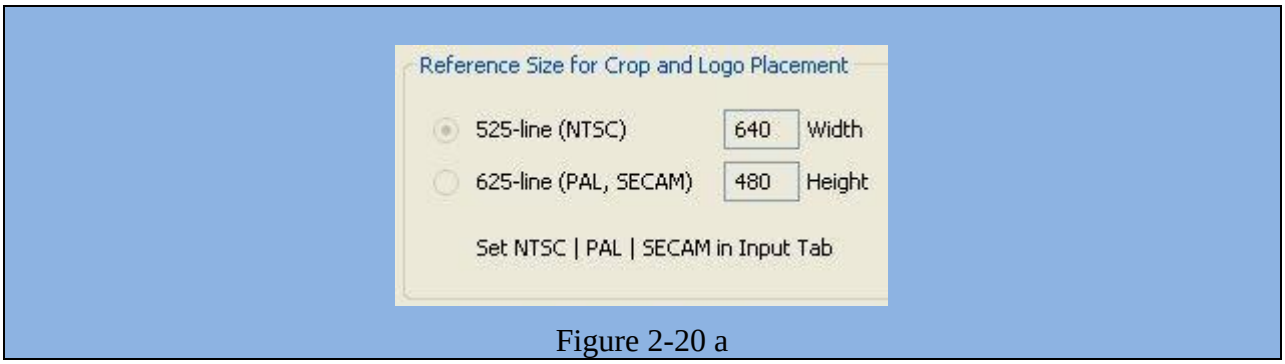


Figure 2-20 a

This part of the dialog is read-only because you do not set it directly – rather, it shows the results of more fundamental settings made elsewhere in the dialog.

The settings shown by the 525-line / 625-line buttons reflects the video standard selected in the Input or Video Decoder tab. (See Figure 2-20a).

NTSC formats result in 525-line, 29.97 frame per second video. PAL (other than -M) and SECAM formats result in 625-line, 25 frame per second video.

The Height and Width boxes show the size of the incoming video based on all the settings you have made.

525-Line (NTSC) Vertical Format

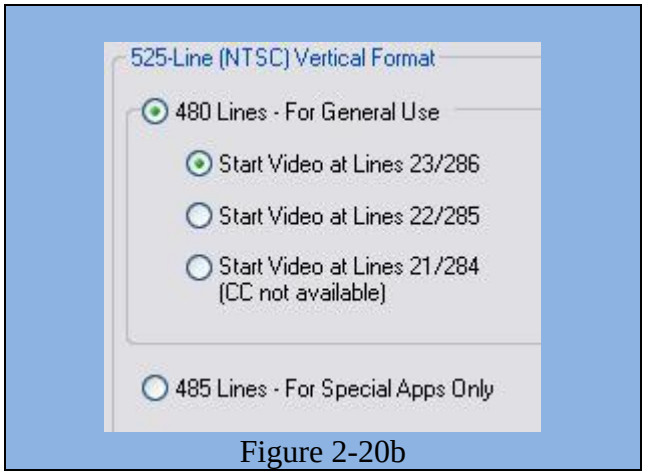


Figure 2-20b

This control is only meaningful for NTSC users. It has no effect for PAL and SECAM 625-line video standards.

Select 480-line video for all normal applications. Select 485-line video for specialized applications.

When 480-line video is selected, you can select which of three video lines should be the top line of displayed or captured video. Lines 21 and 284 are used for Closed Caption in films and broadcast video. Lines 22 and 285 are sometimes used for ancillary data in broadcast video. If these lines are used for data they will appear as moving bands or streaks across the top lines. Therefore, the most generally useful start lines are 23 / 286. For cameras and some packaged content, however, all video lines starting with 21 / 284 can be part of the displayed video.

Section V

The Filters Tab

Figure 2-21 demonstrates the filters tab, which cover two independent technologies: SimulStream and Deinterlacing. Functionality for both technologies exists on the filter tab. In this discussion we will examine each technology separately.

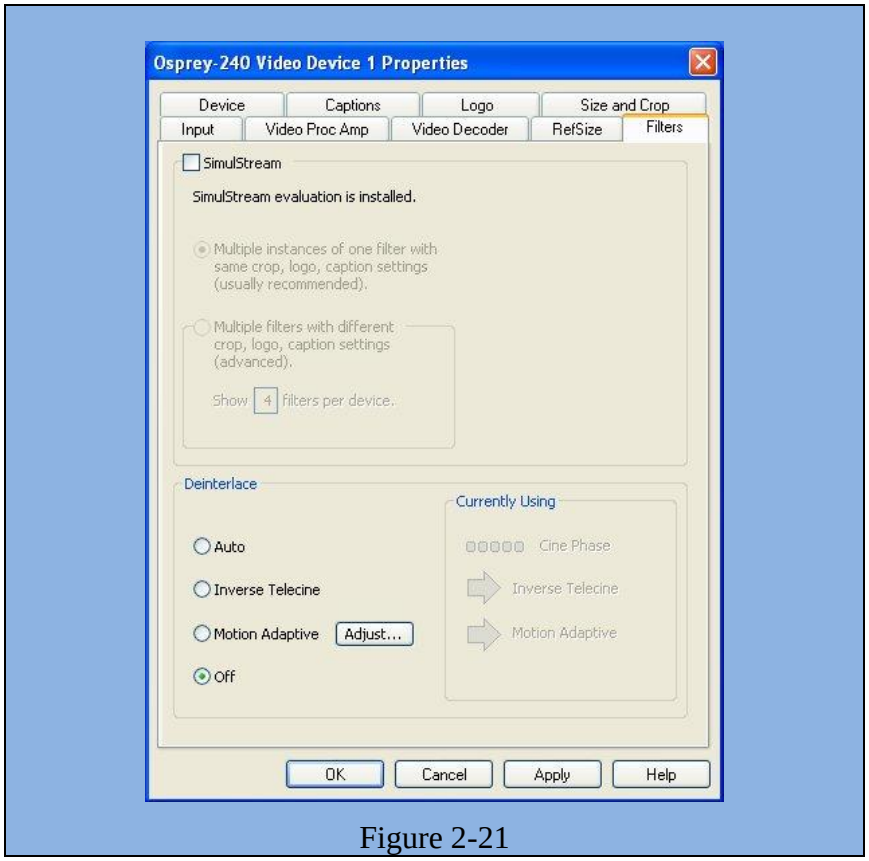


Figure 2-21

SimulStream

SimulStream provides technology so a single capture card can output the same video in different sizes, colors, frame rates, crops, logos, and captioning. You can have multiple video capture streams in a single application, or multiple applications with one or more capture streams.

They allow applications to enumerate and list DirectShow video capture and preview pins or streams (each with different settings) as named entries in their video device select list. You can set up the driver to show 1 to 10 filters per device. Each filter has one preview pin and one capture pin. Standard applications can access a particular filter without any custom programming specialized for Osprey devices.

Each filter has independent settings for cropping, default output size, logos, and captions that can be stored between sessions. Compared to the previous “pin-based” method, there are no requirements for a particular startup order, in order to associate settings with instantiations.

ViewCast includes an evaluation version of SimulStream with the Osprey-240e and Osprey-450e cards; however, any logos or changes you attempt to make will not take effect until you purchase the SimulStream option. You can see the caption "SimulStream evaluation is installed" in Figure 2-22.

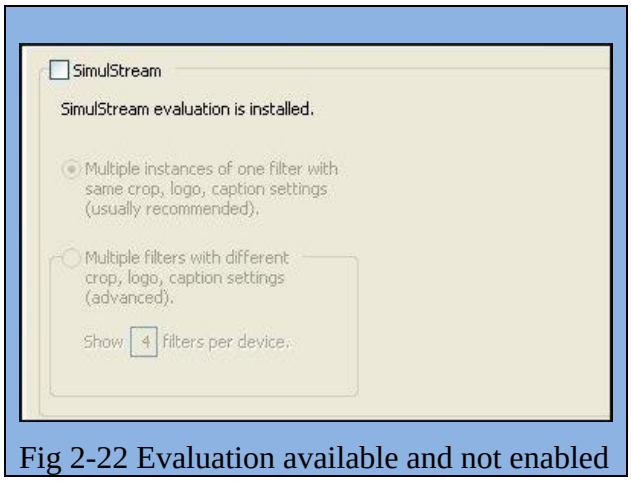


Fig 2-22 Evaluation available and not enabled

Select the checkbox on the filter tab to enable SimulStream in the evaluation mode, and specify how many filters you plan to expose.

All the functions of SimulStream work in the evaluation mode.

When SimulStream is installed the controls in this group affect the fully licensed SimulStream mode, as opposed to the free evaluation mode (See Figure 2-23).

For the Osprey-240e and Osprey-450e, you must purchase a pre-enabled card. You can purchase cards at http://store.viewcast.com

When SimulStream is not installed, it is in evaluation mode. Evaluation mode works the same as full SimulStream except that an evaluation logo is displayed on the video. If you have set up a custom logo, the evaluation logo preempts it as long as evaluation mode is turned on.

Figure 2-23

Enabled Checkbox

The checkbox at the top of the group turns on SimulStream for the currently selected device.

If you have SimulStream license, this checkbox controls SimulStream. If you have a SimulStream license installed but have not turned on SimulStream, the text line at the top of the control group will say that SimulStream is "installed." If you do have SimulStream turned on, the text will say that SimulStream is "enabled."

Show N filters per device.

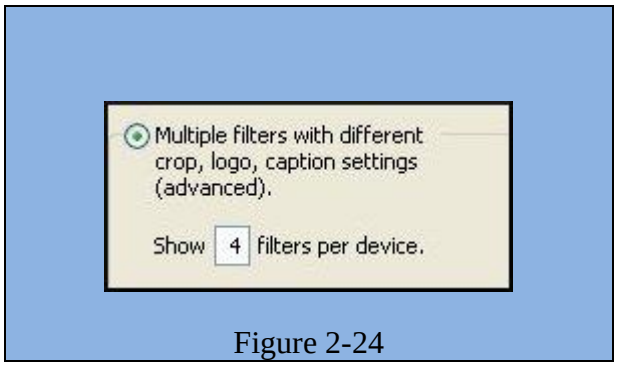


Figure 2-24

You can set up the driver to expose 1 to 10 filters per device (Figure 2-24). If, for example, 4 filters per device are chosen, the device list will show four entries for the current device. For Device 1A, they are designated as 1A.1, 1A.2, 1A.3, and 1A.4.

When you apply this change, a message box comes up asking you to restart the system – it is important that you do so. The number of filters you have requested will not display or work correctly until the system is restarted.

Note – while it is possible to expose and enumerate up to 10 filters per device, the practical number of filters depends on your hardware**.** When video is being directly rendered to the screen, the video format and type of renderer used can make a major difference in system performance and in the number of streams that are possible. If multiple capture devices are in the system, the number of filters is the total across all the devices; in addition, some types of processing such as deinterlacing and gamma correction that are performed once per device may in this case occur multiple times. So, in summary, a high-end, multicore or multiprocessor system can support 5, 6, or more concurrent filters on one device if the processing per filter is light; but only 2 or 3 if the processing load inside or outside of the driver is particular heavy.

Allow multiple instances of each filter

This control enables you to run multiple instances on one device of applications that do not have device select controls. Leave this turned off unless you have a specific need for it. Turning it on will affect crop, logo, and caption settings. They will share a filter and not stand separate. Save the most recent crop, logo, or caption setting and overwrite settings that might have previously been saved from another application.

When you apply this change, a message box comes up asking to restart the system – this change will not work correctly until you do so.

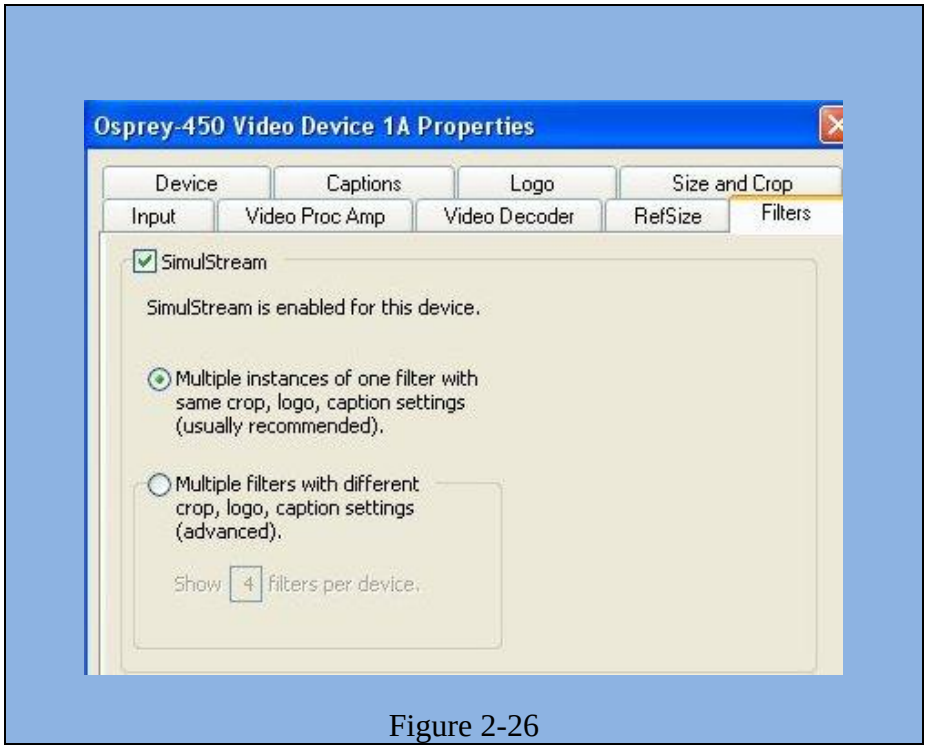


Figure 2-26

SimulStream is a purchased option. In Figure 2-26 you can see the caption indicating SimulStream is enabled. It makes a single hardware device appear as several separate devices capturing the same input stream. Each stream can have different size, color format, frame rate, crop, logo, and captioning. You can have multiple video capture streams in a single application, or multiple applications each with one or more capture streams.

For details about purchasing and installing SimulStream, refer to http://www.viewcast.com.

The driver includes an evaluation version for you to try out for free. Evaluation mode works the same as licensed SimulStream except that an evaluation mode graphic is always displayed on the video.

You can have as many streams from the device as you want. They can different resolutions, bit rates and formats. The term "one filter" refers to the fact that all streams have the same Osprey custom properties. Specifically, cropping, logos (watermarks), and NTSC Closed Caption rendering settings must work the same for all streams on the device.

The advantage of this mode is that it is simpler. We recommend this mode if you don't use Osprey custom cropping, logos or Closed Captions, or if all streams have the same settings.

You can use the OspreyWizard applet included with new versions of the driver to do all the setup for the One Filter option.

This setting affects all devices served by the currently accessed driver. The driver will advise you to restart the system or your application if this is needed.

Multiple Filters

Use this mode if you are using Osprey custom cropping, logos (watermarks), and NTSC Closed Caption rendering, and want each stream to have separate settings for these items.

This mode is definitely more complicated than the "One Filter" option just described – so only use it if you are sure you need it. Note that you do not have to use this mode if the only things you want to be different on different streams are the video output size, color format, and/or frame rate. The application stores these settings, not the driver.

The term "multiple filters" refers to the method of saving and accessing these different settings. You can have 1 to 10 different filters, each holding different settings. The number of settings is determined by the edit box in the picture above "Show [4] filters per device."

For example suppose you elect to have 4 filters per device, each with separate crop, logo, and caption settings. Let's say the underlying device has had the name "Osprey-240 Video Device 1". With SimulStream enabled, when you open a list of capture devices, you will see "Osprey-240 Video Device 1.1", "Osprey-240 Video Device 1.2", and "…1.3" and "…1.4".

To set the custom properties for one of these filter, select it from the device list and open the driver properties dialog. The title at the top of the dialog will confirm that you are setting up, for example, "Osprey-240 Video Device 1.2". When you set crop, logo, and caption settings, these will be saved separately for Device 1.2 and will not affect Devices 1.1, 1.3, or 1.4. Settings that are not per-filter – such as Reference Size or the Video Proc Amp settings – will affect all filters on the underlying Osprey-240 Video Device 1.

Later, whenever you select one of the four filters as your capture filter, the Osprey custom crop, logo, and caption settings previously set for that filter will be selected automatically.

You can have multiple streams on each filter. For example, you could have four streams consisting of two instances of "Osprey-240 Video Device 1.1", and two instances of "Osprey-240 Video Device 1.2". The first two instances will have filter 1.1's settings; the second two instances filter 1.2's settings.

This setting affects all devices served by the currently accessed driver. The driver will advise you to restart the system or your application if this is needed.

Deinterlace

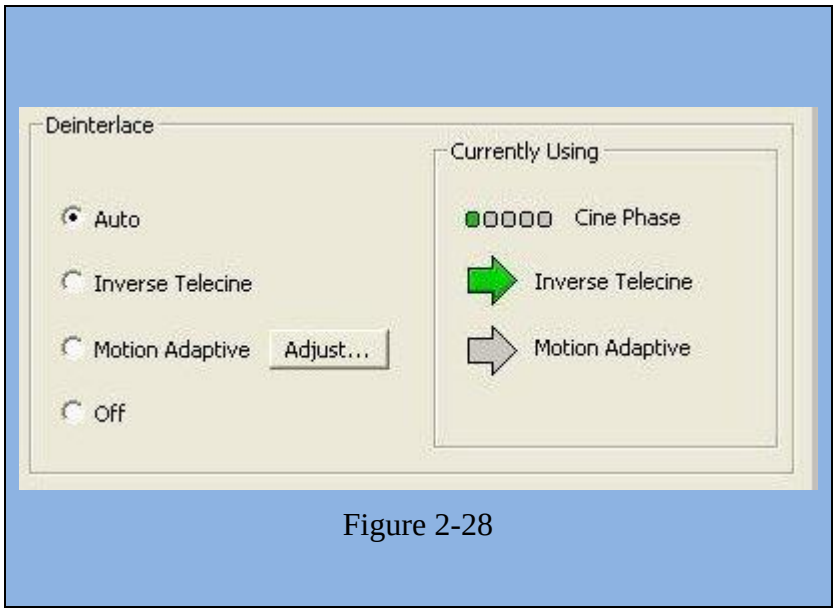


Figure 2-28

The deinterlace group has four radio buttons:
Auto – Apply inverse telecine deinterlacing to all telecine video. Apply motion adaptive deinterlacing to all video that is not telecine. Switch dynamically between the two modes as the content changes. Available for NTSC video only.
Inverse Telecine – Apply inverse telecine deinterlacing to all telecine video. Perform no deinterlacing of video that is not telecine. Available for NTSC video only.
Motion Adaptive – Apply motion adaptive deinterlacing to all video.
Off – Perform no deinterlacing of any kind

Deinterlace settings are applied and stored per-device and are applied to all filters and pins associated with a device.

Background – telecine and inverse telecine:

Telecine video is NTSC video that was originally created on film at 24 frames per second. In the telecine conversion process certain fields are repeated in a regular, recurring sequence. If a telecined sequence is viewed directly on a progressive screen, interlacing artifacts will be visible.

The process called Inverse Telecine is the reverse of Telecine – it drops the redundant fields and reassembles the video in a 24 fps progressive format. Interlacing artifacts are 100% removed. If the video is viewed at 24 fps, you will see the exact timing and sequencing that was on the original film. If the video is viewed at 30 fps, every 5th frame will be repeated; however, there will be no deinterlacing artifacts.

Telecine and inverse telecine only apply to NTSC video. They are not used for PAL and SECAM video. The Auto and Inverse Telecine buttons will be disabled when PAL or SECAM is selected as the video standard.

Background – motion adaptive deinterlace:

Motion adaptive deinterlace is an algorithm for deinterlacing pure video (non-telecine) content. It detects which portions of the image are still, and which portions are in motion, and applies different processing to each.

The Currently Using Group

These indicators allow you to see the current algorithm. These are NOT control buttons – they are read-only indicators. They are mainly useful in Auto Mode, to indicate which algorithm – Inverse Telecine or Motion Adaptive – is currently being applied. They are also useful in Inverse Telecine mode to show whether telecine content is present and the Inverse Telecine algorithm is being applied.

The mode currently in use is marked by a green arrow (Figure 2-29). A mode that is possible under current control settings but not currently in use is marked by a dark grey arrow. A mode that is not available with the current control settings is marked by a pale outline arrow.

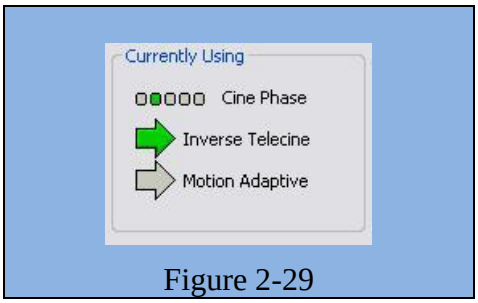


Figure 2-29

With inverse telecine enabled, when telecine content is detected, the five Cine Phase dots show whether the 3:2 pulldown sequence is shifting. If it is shifting, the green marker will shift. This will happen in mixed telecine/video content, and also in content that was converted to telecine and then post-edited in the video domain. Whenever a shift happens, there will be a few frames that are not deinterlaced. If these shifts are frequent, you may have to switch to Motion Adaptive deinterlacing for consistent quality.

When the telecine detector locks the first time in a streaming session, the leftmost Cine Phase button will be green. If the telecine sequence is perfectly coherent, the phase will never shift. Once it does shift, the absolute phase of the Cine Phase display (which of buttons 1 through 5 is green) is not significant – the only significant fact is that phase shifts are occurring. When the sequence relocks, all phase button are equally correct.

The Adjust Dialog:

Use the adjust dialog to adjust the parameters that control motion adaptive deinterlacing. (Figure 2-30).

Note: When the driver is using the Inverse Telecine algorithm, either in Telecine mode or Auto mode, the Adjust settings have no effect at all, and Test Mode is inoperative.

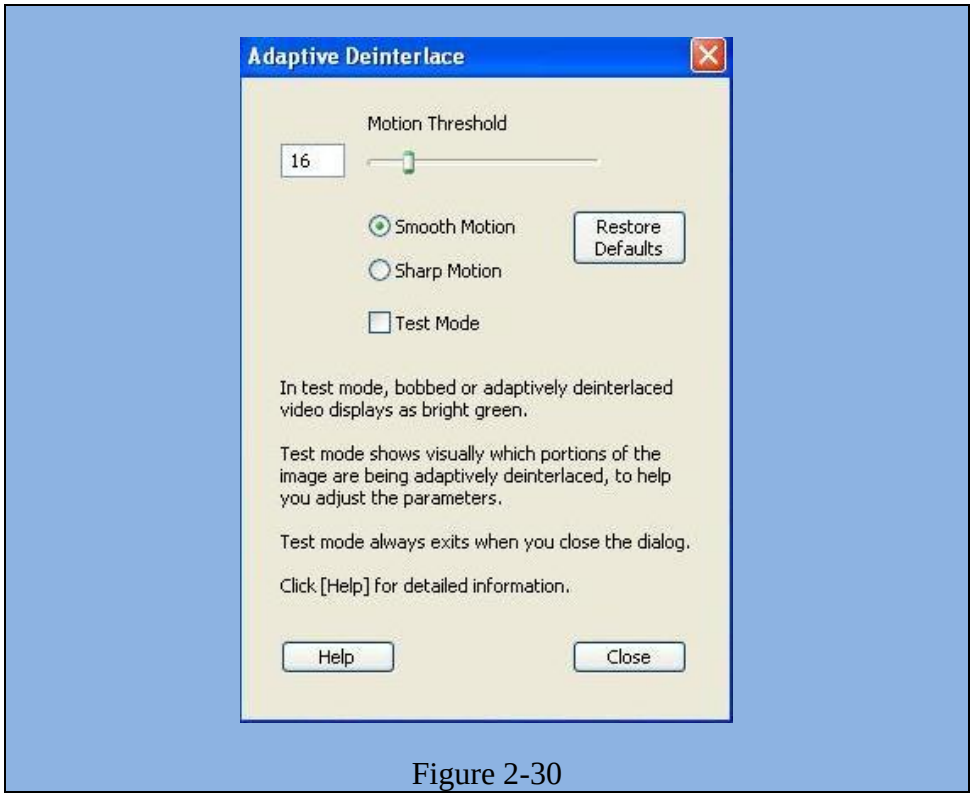


Figure 2-30

Motion Threshold: The Motion Threshold slider and edit box adjust the threshold of difference from spatially and temporally related pixels that is judged to be "motion." If you enter Test Mode and move the slider to the right, the number of pixels that are considered in motion will be greatly reduced. As you move the slider to the left, the number of motion pixels will greatly increase until nearly the entire screen is considered in motion. The recommended default is 16.

Sharp and Smooth Motion: When the Sharp Motion radio button is selected, detail in motion areas will be sharper, but at the expense of somewhat jagged diagonal edges.

When the Smooth Motion radio button is selected, there will be more loss of detail in motion areas, but edges will be smoother. Since the eye does not see detail clearly in areas of motion anyway – whereas edge artifacts are always highly intrusive – the Smooth algorithm should be preferred for most applications. The Smooth algorithm uses a bit more CPU.

Both algorithms treat still areas (areas that are not green in Test Mode) the same way, and there should be no loss of detail in still areas.

Test Mode: When the Test Mode box is checked, the motion adaptive algorithm enters a test mode that displays motion pixels as bright green dots. The dots will mainly be along edges that are in motion, but if the motion threshold is set too high there may also be a random distribution of green dots caused by pixel jitter and instability of the video signal. The extensiveness of the green areas will vary according to the settings of the other adjust controls. Test mode is always automatically exited when you exit the Adjust dialog.

In Test Mode, with the Sharp algorithm green speckles will be on alternate lines only, and with the Smooth algorithm they will be on all lines.

Notes:

1. If your video format results in exact 2:1 or 4:1 vertical scaling for a particular pin, then all the video will come from one field. This will be the case for uncropped NTSC CIF (320x240) or QCIF (160x120). It may be the case for special cases of cropped video as well.

   In the PostProcessing sequence as currently implemented, the "sharp" motion adaptive deinterlacing algorithm has no effect on single-field streams, since it alters only the field that these streams do not use. The "smooth" algorithm operates on both fields and may have a detectable blurring effect on areas of motion. ("Sharp and "smooth" are set in the Adjusts subdialog.)

   Inverse telecine if enabled does not affect the individual fields for a one-field pin; however, if the pin's frame rate is 24, the driver will detect and remove the frames that are repeats. If you are streaming multiple pins, and the exact single-field special scaling case holds true for one pin but not another, different processing will be applied to the two pins.

2. When Auto mode is selected, some kinds of content will cause the driver to frequently switch between Inverse Telecine and Motion Adaptive processing. Content such as title sequences and commercials are often telecine, but cuts between scenes generally break the telecine sequence, forcing the driver to resynchronize. It takes it a number of frames to lock on to the new sequence. The driver will drop back to the Motion Adaptive algorithm as soon as it becomes aware that telecine sync has been lost. However, it may take it several frames to discover that this has happened; these frames will not be correctly deinterlaced.

   You should decide whether to use Auto, Inverse Telecine, or Motion Adaptive mode depending on the type of content you expect.

   If the content is consistently telecine, then either Auto or Inverse Telecine is recommended for perfect recovery of the original progressive format.

   If the content is telecine with post-detelecine video-based editing, Auto mode will result in the best overall quality – but there may be several frames that are not deinterlaced every time the pull down phase sequence has to be relocked.

   If the content format is a rapidly changing mix of telecine and video, or is all video, or is of unknown type, the Motion Adaptive setting will give the most consistent results. The quality of telecine sequences will not be the best possible, but there will be no instances of frames not deinterlaced at all due to telecine re-locking.

Section VI

The Device Tab

These controls (Figure 2- 31) are less often used items. Unless specifically noted, changes made on this page apply to all filters and all video preview and capture pins on the currently selected device. Unless noted, different settings may be set and stored for different devices.

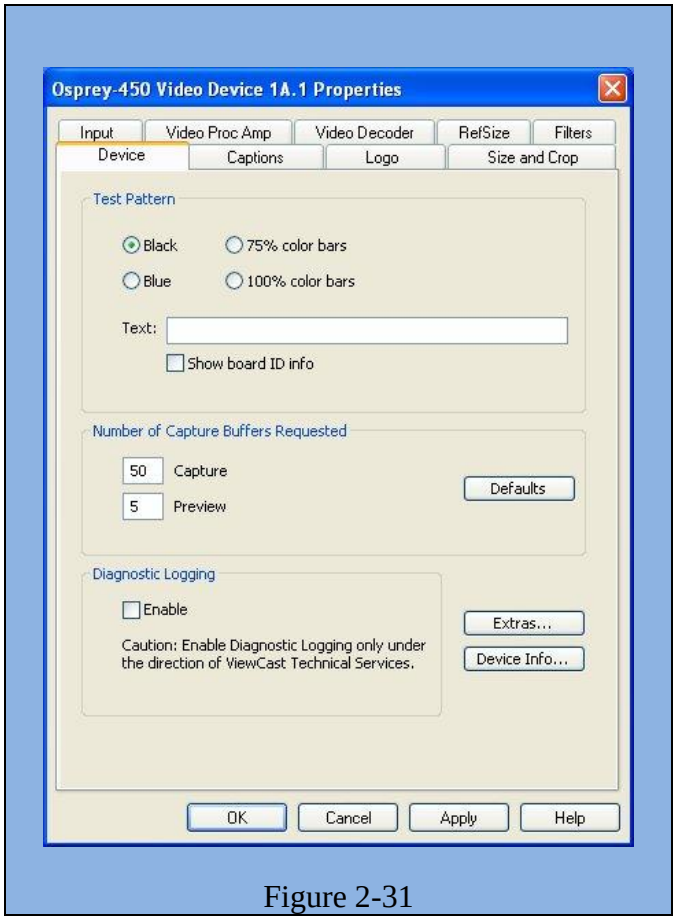


Figure 2-31

- **Test Pattern**
- **Number of Capture Buffers Requested**
- **Diagnostic Logging**
- **Device Information**
- **Extras**

Test Pattern

You can select one of four patterns when no video signal is present – black, blue, 75% color bars and 100% color bars.

You can place a text line on the test pattern. If the Text edit box is empty - meaning NO spaces and no text characters – then no text will exist. Otherwise, whatever you type here, up to 32 characters will be displayed on the test pattern.

Number of Capture Buffers Requested

The driver can tell DirectShow the minimum number of video capture buffers it needs to have allocated for proper operation (Figure 2-32). The client application may ask for a different number of buffers; in general DirectShow will honor the larger of the requests.

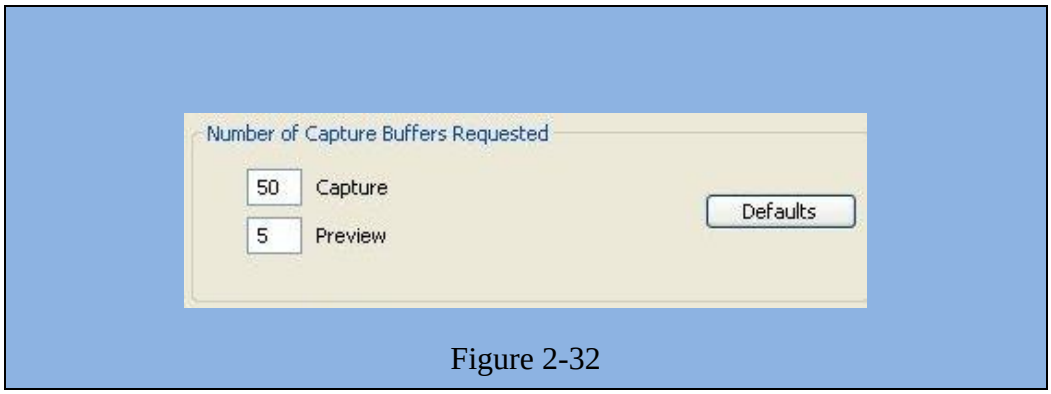


Figure 2-32

Buffers are used in a round-robin style. The driver fills a buffer; the client then consumes the buffer, and releases it when it is done. The buffer then circulates back to the driver to be filled with video again. If the client holds on to a large number of buffers at once, there is the possibility that there will be no empty buffers available to the driver. The result will be dropped frames. The solution is to allocate a larger number of buffers.

Capture and encoding applications generally need a large number of buffers so that they can deeply pipeline the downstream processing without danger of buffer starvation at the driver. If there is evidence of buffer starvation, in the form of dropped frames, you can try increasing the number of buffers allocated for the Capture pin.

Preview video that is directly rendered on the screen does not use deep pipelining and cannot benefit from it. There has been some evidence that too many buffers for direct rendering can harm performance.

So:

1. On the Capture pin, you can increase the number of buffers from the default 50 for deeper pipelining and more resistance to dropped frames.

2. On the Capture pin, you can reduce the number of buffers to around 5 if the video is going to be used only for direct rendering. Remember to put the number back to 50 or more for capture or encoding – 5 may not be enough and may result in many dropped frames.

3. On the Preview pin, you can increase the number of buffers to 20 or more if you are using it for capture or encoding rather than direct rendering.

Diagnostic Logging

For use by ViewCast Technical Support Only

Device Information

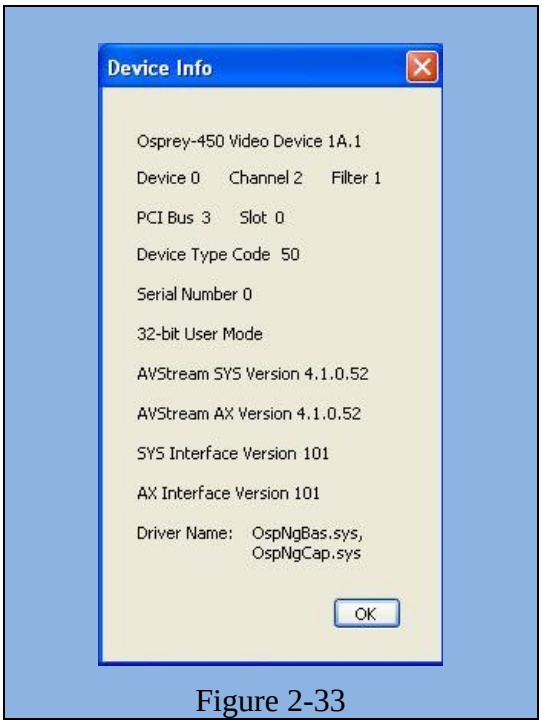


Figure 2-33

This button display useful information about the capture card and the driver, including the DirectShow name of the device (See Figure 2-33).

Extras

"Extras"(Figure 2-34) are features of the AVStream driver that are new, not fully defined, or subject to change. Extras may also include workarounds to apparent DirectShow issues that are expected to be resolved fairly soon.

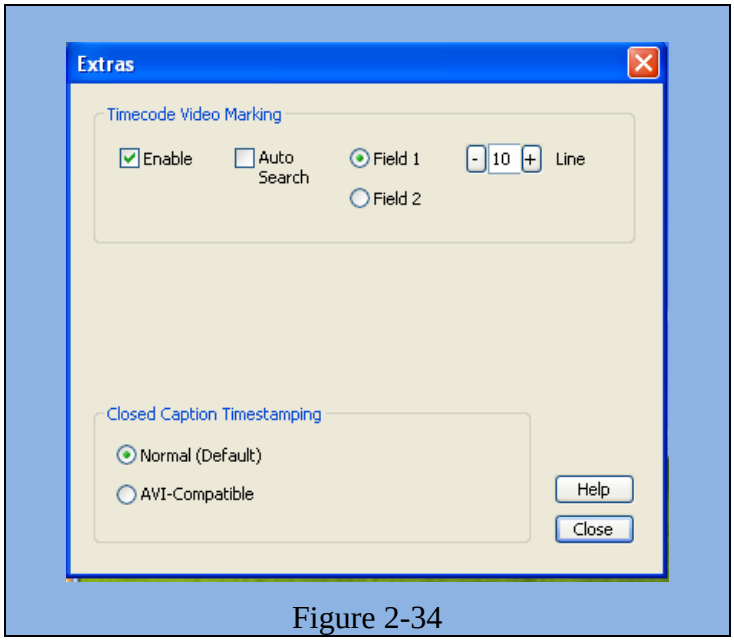


Figure 2-34

Extras should be expected to change more frequently than other aspects of the driver. The current Extras are the following:

Timecode Video Marking: Refer to the Vertical Interval Timecode of this guide (Chapter 3, Page 60) for more information.

Closed Caption Timestamping: This control is a workaround to what we currently believe to be a problem in DirectShow with capture of CC to AVI files. If you attempt to capture a CC character pair stream along with a video stream to an AVI file with "Normal" timestamping, the file will become extremely large and the capture will fail within a few seconds. "AVI-Compatible" mode allows capture of CC to AVI. Unfortunately, the problems with timestamping mean that time synchronization between the video and CC streams depends on their physical interleaving in the file, so that time synchronization will be quite poor; we do not have a workaround for this at this time. For all applications other than capture to AVI, this control should be set to "Normal." WME9 among others requires the "Normal" setting if CC is used.

Section VII

The Captions Tab

When the “Both” radio button is selected, changes you make to the captioning setup apply to both the capture and preview pins. This is the default setting. (See Figure 2-35).

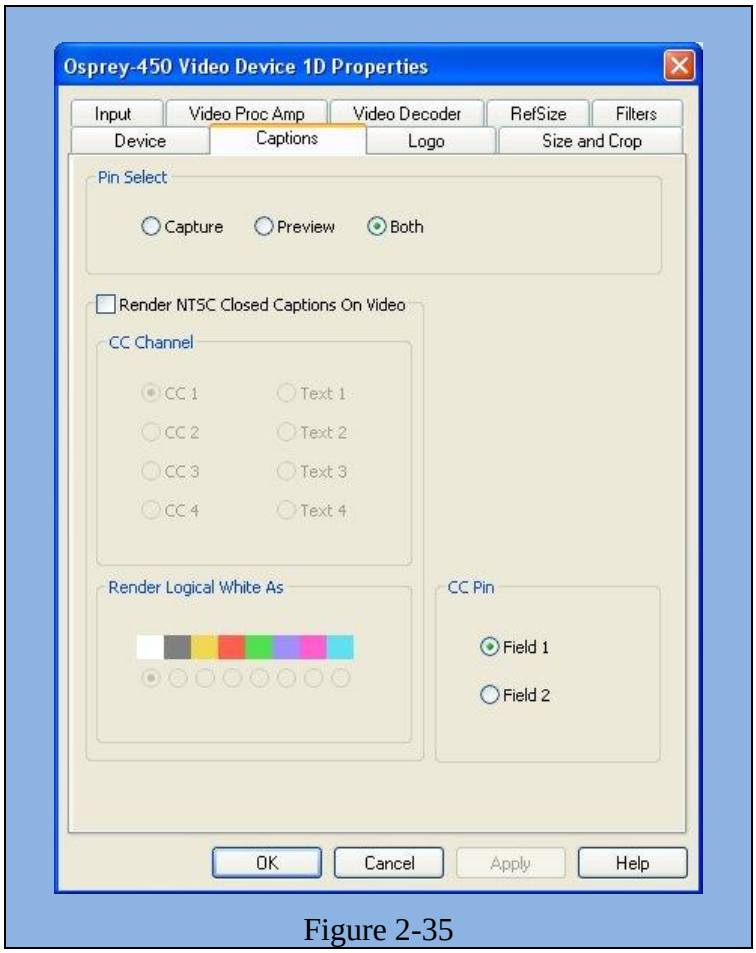


Figure 2-35

Pin Select

If you like, however, you can have different setups for the two pins. For example, you could enable cropping on the capture pin but not on the preview pin. When you select the “Capture” radio button, the current captioning settings for the capture pin are loaded, and changes you make apply only to the capture pin, not to the preview pin. The “Preview” button works analogously.

Render NTSC Closed Captions on Video

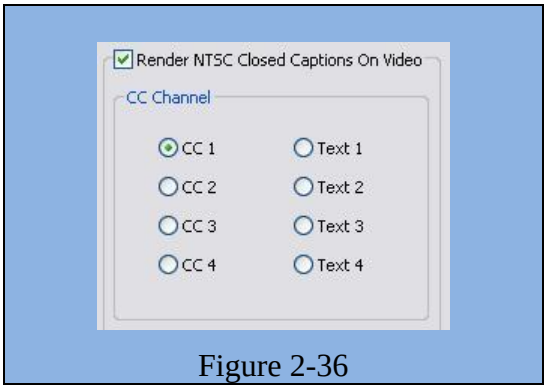


Figure 2-36

The 4.2 driver can internally render closed captions on video when NTSC video is selected on the input. Refer to Figure 2-36. There is a control to select which channel to render (although CC 1 is the only channel that is commonly used).

Note that this control only affects rendering on video performed internally by the driver. The AVStream 4.2 driver has two additional ways of delivering captions.

First, it exposes a DirectShow-standard CC pin. This pin can be used directly by applications such as Windows Media Encoder's scripting facility.

Second, the driver has a proprietary Closed Caption API for use by C++ developers. It delivers raw captioning data from any CC or Text channel. It also delivers line-interpreted data from these channels, suitable for a scripting display or for capture to an ASCII file. Is also delivers XDS – "Vchip" and other ancillary data – in raw form.

The control group "Render Logical White As" maps white captions to a color other than white. This is a proprietary extension to the Closed Captioning standard. When logical white is mapped to, for example, red, the CC standard captioning red also works; however, it is not possible to distinguish "logical white" red captions from "standard colored" red captions. Since standard colored captions are so little used, this characteristic has little practical effect.

Figure 2- 37

CC Pin

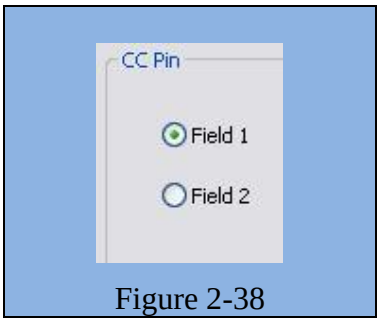


Figure 2-38

This group controls whether the closed caption character pairs emitted by the DirectShow CC pin are from field 1 or field 2 of the video. The DirectShow specification is that CC on a CC pin is always from field 1; however, this extension allows application developers to access field 2 data such as XDS data (including vchip) via a DShow standard pin.

Section VIII

The Logo Tab

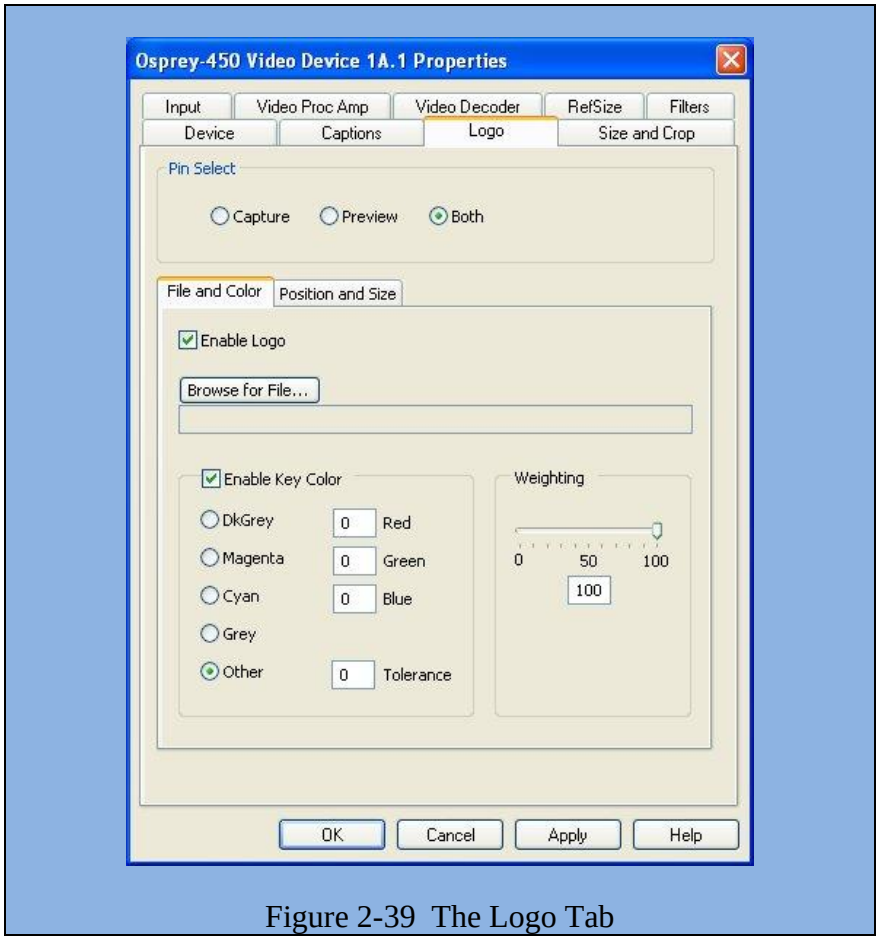


Figure 2-39 The Logo Tab

The logo property superimposes a graphic over captured video using the logo property controls. We've depicted this property tab in Figure 2-39

Logos have the following characteristics:

- Any RGB-24 bitmap in .bmp file format can be used.
- A selectable key color can be specified; all parts of the logo graphic with that color are not drawn on the video.
- A transparency control can be used to blend the logo graphic with the background video.
- The logo can be interactively positioned and scaled.
- The logo appears on both captured and previewed video. If the capture and preview video are different sizes, the logo is scaled to look the same on the preview video.

The logo property controls work best when you are already running preview video. With preview video running, you can view your changes interactively. (If your application displays capture video in real time, capture video can be used instead).

The logo property is organized as two sub-pages – File and Color, and Position. The Pin Select control group and Enable Logo are common to all three. For other controls, click the File, Color, or Position radio button to bring up the right sub-page.

Logo Pin Select

When the "Both" radio button is selected, changes you make to the logo setup apply to both the capture and preview pins. (Figure 2-40).

If you like, however, you can have different setups for the two pins. For example, you could enable the logo on the capture pin but not on the preview pin, and thereby save some CPU time. When you select the "Capture" radio button, the current logo settings for the capture pin are loaded, and changes you make apply only to the capture pin, not to the preview pin. The "Preview" button works analogously.

Windows Media Encoder does not grey out the Pin Select choices, and you have the options to choose "Capture," "Preview," or "Both."

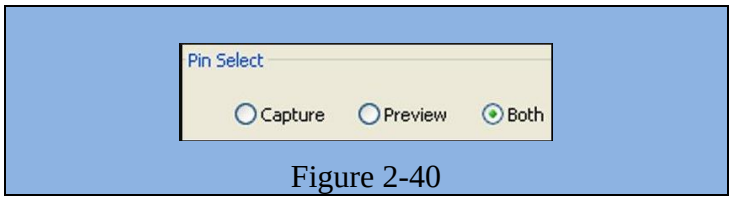


Figure 2-40

Logo File and Color

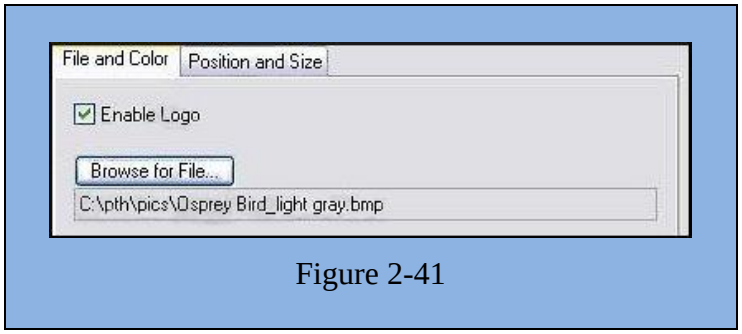


Figure 2-41

The Enable Logo checkbox, which is repeated on both sub-tabs, enables or disables logos. If you disable logos, all your other logo settings are retained for when you re-enable logos again.

In Figure 2-41, the [Browse…] button brings up a standard file select dialog. Logo files must be:

- In .bmp format with a .bmp filename extension.
- In RGB-24 format.

If you have a graphic that is in another format, edit it with a drawing or photo edit program such as Windows Paint, and save it as RGB-24.

Enable Keycolor

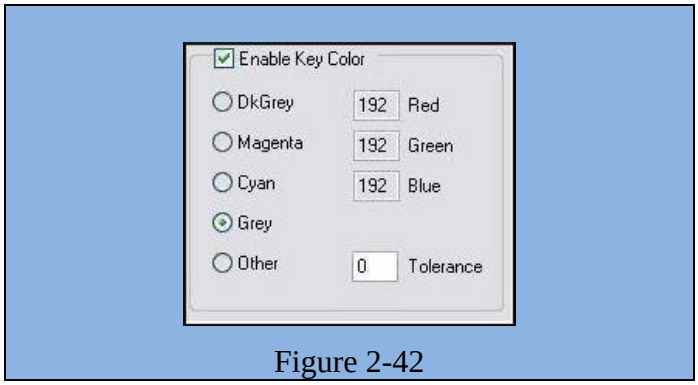


Figure 2-42

You can control the key color and the transparency effect. If preview video is running, you will see your changes interactively.

A "key color" is a color that disappears from the graphic so that the underlying video shows through unchanged.

If the Enable Key Color checkbox is unchecked, all colors are displayed.

If the checkbox is checked, key coloring is activated. The five radio buttons are activated. You can select one of four standard colors – dark gray, medium gray, cyan, or magenta – or a custom color. It you select Other, for a custom color, the three edit boxes – Red, Green, Blue – are activated, and you can enter any color value into these boxes.

Keycolors to identify transparent portions of logos can be exact or inexact. The Tolerance control (Figure 2-43) determines this. If Tolerance is 0, then all keycolors have to exactly match the Red / Green / Blue values shown in the key color control group. If Tolerance is nonzero, then the Red / Green / Blue values can deviate from the keycolor by the tolerance value and still be treated as being equal to the keycolor. For example, if Tolerance is set to 5, and the keycolor is set to grey (192, 192, 192), then pixels in the bitmap with value (187, 187, 187) will also be transparent.

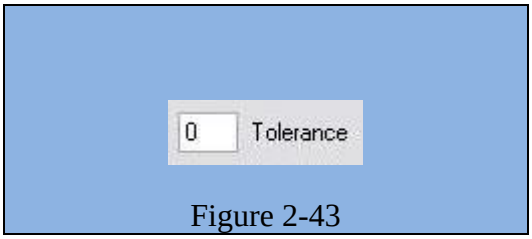


Figure 2-43

Weighting

The degree of transparency of the logo is variable through 101 steps. If the setting is 100, the logo will be opaque. If the setting is 0, the logo will be completely transparent. If you have set a keycolor, the weighting or transparency value is applied only to pixels that do not match the keycolor and hence are always completely transparent. You can set the weighting either with the slider or by editing the number in the edit box. (Figure 2-44).

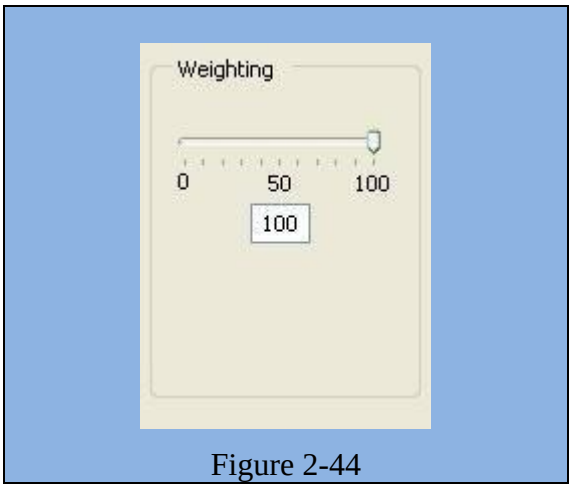


Figure 2-44

Note that the SimulStream Eval logo is a special case – it is restricted to the range 50 to 100 so that it cannot be made completely transparent

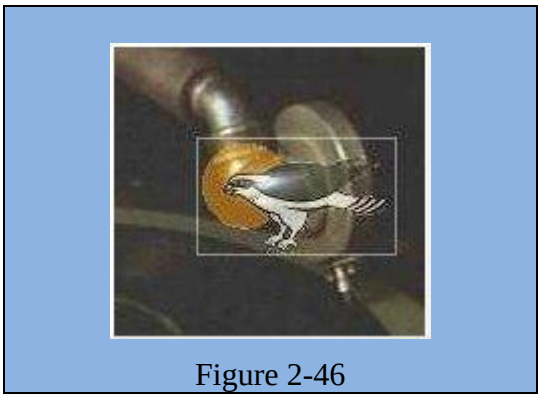


Figure 2-46

Logo Position and Size

The Logo Position and Size sub-tab lets you position and scale the logo. It is strongly recommended that you have preview video running when you use these controls.

The large indented rectangular area at the top of this sub-tab represents the video area where the logo can be positioned. The smaller rectangle represents the logo. To position the logo, click on the logo rectangle and drag it to the new position.

The four “Nudge” buttons, L, R, U, and D, move the logo left, right, up, or down exactly one pixel at a time on the output video. Since the positioning rectangle may be scaled down from the full video size, the Nudge buttons allow more accurate positioning of the logo.

The slide control at the bottom right of this sub-tab controls the scaling of the logo. The [1X Scale] button returns the size to the original size of the .bmp graphic. The quality of a scaled image will not be as good as the quality of the 1X image. We recommend that wherever possible for production work you prepare artwork of the exact size at which it will be used.

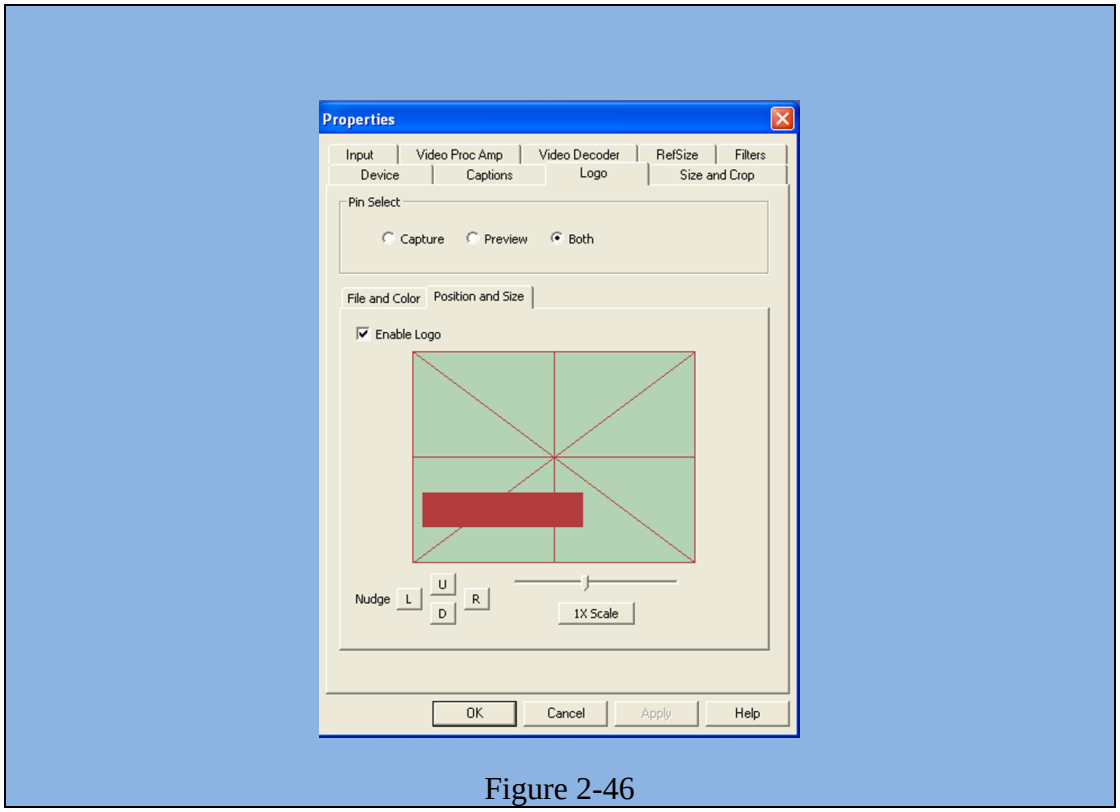


Figure 2-46

Notes on Logos:

- Because the logo properties tab is used to set up a logo interactively on live video, its behavior is different from the behavior of the other tabs. The driver updates the controls on the logo tab immediately, without waiting for you to click [Apply]. You will see that [Apply] enabled only right after you select a different pin spec. As soon as you make any change to any logo control, [Apply] becomes disabled and stays that way until you change to another pin spec.
- If you set up a logo with video set to one size, then resize the video, the logo is not scaled correspondingly. This may not be desirable, since you may want the logo to expand to the same scale as the video window. Click the [1X Scale] button to restore the logo to its unscaled size or import a logo prescaled to the new desired size to ensure the best image quality.

Section IX

The Size and Crop Tab

This tab has two functions. It sets the default output size, whether or not cropping is enabled. It enables and disables cropping, and sets the cropping rectangle. (You can see the various functions in Figure 2-47).

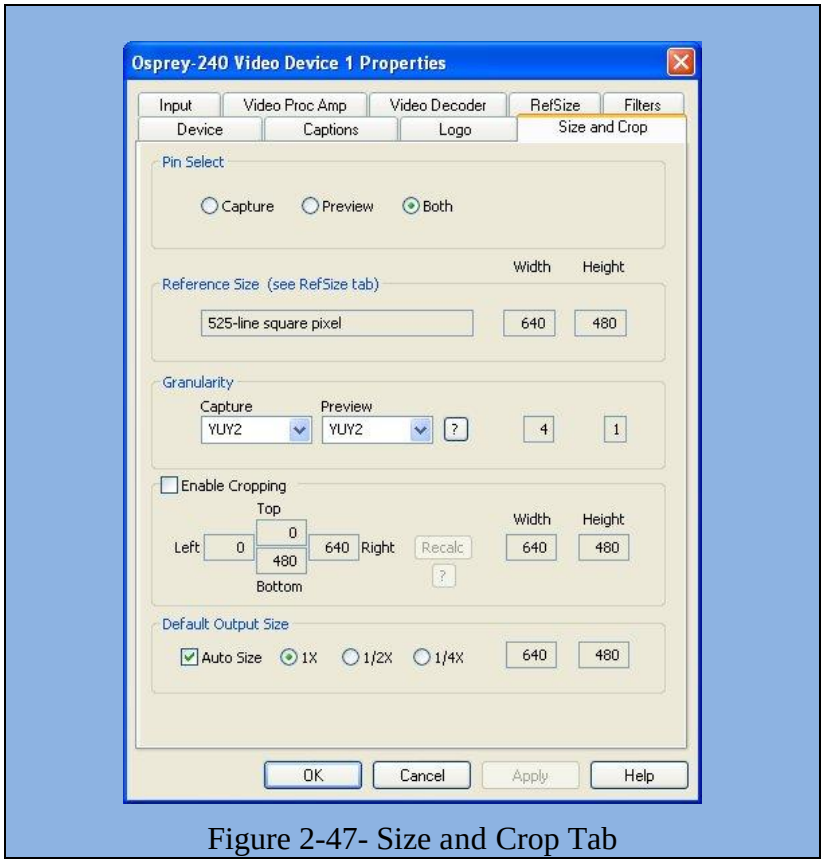


Figure 2-47- Size and Crop Tab

The default output size is the video size that appears in the DirectShow pin properties dialog as the "default" choice. It is a pathway for setting a custom or nonstandard video size in applications that do not have a custom video sizing controls built into them.

"Cropping" means removal of unwanted video around the edges of the incoming image. For example, if the incoming video is letterboxed, with an aspect ratio wider than 4:3, you can crop away the black slivers at the top and bottom of the image and capture just the active portion. Changes made on this page apply to all video preview and capture pins on the currently selected device.

- **Pin Select**
- **Reference Size**
- **Granularity**
- **Enable Cropping**
- **Default Size**

Pin Select

When the "Both" radio button is selected, changes you make to the crop setup apply to both the capture and preview pins. This is the default setting and is what most users will want.

If you like, however, you can have different setups for the two pins. For example, you could enable cropping on the capture pin but not on the preview pin. When you select the "Capture" radio button, the current crop settings for the capture pin are loaded, and changes you make apply only to the capture pin, not to the preview pin. The "Preview" button works analogously.

Reference Size

The reference size information is always read-only on this dialog tab. It is determined by settings made on other tabs – specifically, the Input tab, where a 525-line or 625-line standard is selected, and the RefSize tab, where Square Pixel or CCIR proportioning is selected. The read-only text box describes which of these options is currently governing the reference size.

The reference width and height represent the full uncropped size of the incoming video. Your crop settings are interpreted relative to this reference size. For example, if you are capturing 525-line video, with a reference size of 640x480, and your crop rectangle is (0, 0, 640, 480), then your video is effectively uncropped. But if you are capturing 625-line video, with a reference size of 768x576, the same (0, 0, 640, 480) crop specification will truncate the right and bottom edges of the video.

Granularity and Alignment

Osprey products impose restrictions on the possible width and/or height of the video, referred to as "granularity" restrictions. For example, the I420 capture format requires that the capture width be a multiple of 16 and the capture height be a multiple of 2. When video is cropped they also impose a requirement for alignment of the left side of the cropped video field. The specific requirements for the 4.2 driver are changed from the 3.X.X driver versions.

The granularities for all products in Post Processing Mode are as follows:

	Granularity		Alignment	
Format	**Horizontal**	**Vertical**	**Horizontal**	**Vertical**
YUY2	4	1	2	1
UYUV	4	1	2	1
I420	4	2	2	1
YVU9	4	4	2	1
RGB555	4	1	2	1
RGB24	4	1	2	1
RGB32	4	1	2	1
Greyscale	4	1	2	1
[none]	4	1	2	1
[any]	4	4	2	1

The Granularity controls show you set restrictions for the selected video format, and assist you in choosing crop and output sizes that observe those restrictions. Since alignment is the same for all formats, there is no control for it.

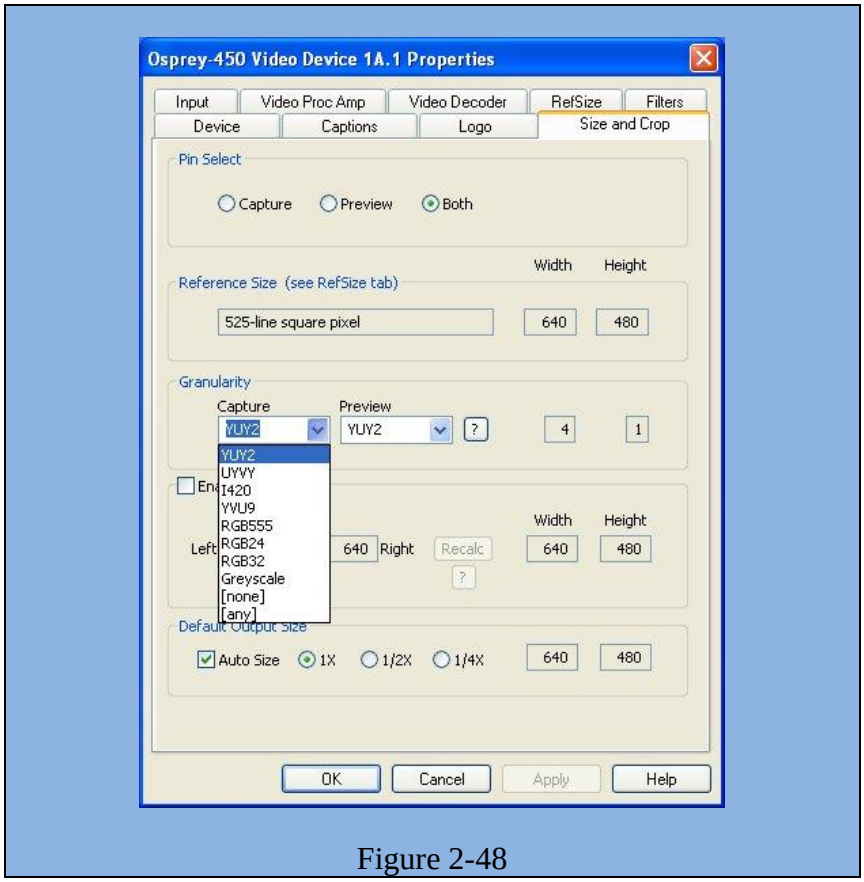


Figure 2-48

Since the preview and capture pins may be set to different color formats, they may have different granularities. When the Crop tab is opened, the two drop boxes titled Capture and Preview are initialized to the current or most recently used format for the selected pin. (See Figure 2-48).

If your Pin Select setting is "Capture," only the Capture granularity box will be enabled; similarly for Preview. The two small read-only edit boxes to the right of the group show the horizontal and vertical granularities for the selected color format for the selected pin type.

If your Pin Select setting is "Both," both the Capture and Preview drop boxes are enabled, and the two boxes to the right of the group show the worst-case granularity that works for both the Capture and Preview color formats. For example, if the Capture color format is I420 and the Preview color format is YUY2, the resultant granularity is I420's more stringent 4x2 requirement.

The granularity and alignment settings affect values you subsequently enter for crop width, crop height, and default output width and height – they will be adjusted to these granularities. Adjustments are made when you click "Recalc," "Apply," or "OK."

You can change the video format in the drop box, so that granularities are set for a different format. Note that this does not automatically cause the pin to have this format – you still have to select that format using the Pin Properties dialog or via your application. It just ensures that the sizes you select will work correctly when you do select this color format in the application.

If you set up your crops with a less restrictive granularity (for example, YUY2) and then capture with a more restricted granularity (for example, I420), the driver may automatically adjust the video crop and/or output size without notifying you. Or, the capture may fail. You may also find that in the Pin Properties dialog the default size you wanted is not listed – because it is not a legal size for this format.

If you select "[none]" as the color format(s), the minimum granularity and alignment adjustments are applied to your crop and size data.

If you select "[any]" as the video format, the coarsest granularity required by any of the available formats is applied to your crop and size data. In practice, "[any]" is the same as YVU9, that is, 4x4. You are guaranteed that your crop and output sizes will never be adjusted, regardless of what video format you select now or in the future.

Enable Cropping

If you uncheck the Enable Cropping checkbox, your video will not be cropped regardless of any crop settings you might previously have made. The edit boxes showing the edges, height, and width of your crop will be read-only and will show settings for full-frame, uncropped video.

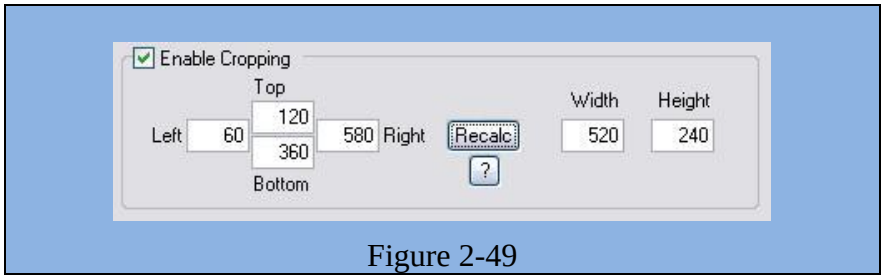


Figure 2-49

If you check the Enable Cropping checkbox, your video will be cropped to the indicated boundaries. Previously stored crop settings will be recovered. The six edit-boxes are enabled. The Top and Left boxes set the top left corner of the cropping rectangle. The Right and Bottom boxes set the bottom right. The Width and Height boxes set the size of the rectangle.

The Recalc Button

The Recalc button recalculates whichever of the six crop edit boxes you have not filled in. For example, if you set Top, Left, Width, and Height, Recalc will calculate Right and Bottom. If you set Top, Left, Right, and Bottom, Recalc will calculate Width and Height. Whichever of the vertical group was least recently touched, is the item that will be recalculated; similarly with the horizontal group. If you have only changed one box of the group, you can force the order of recalculation by clicking one of the other two boxes. For example: If you have changed Left, and you want to preserve Width (but alter Right), then click on Width before Recalc. If you have changed Left, and want to preserve Right (but alter Width), then click on Right before Recalc.

If your specification will result in a crop rectangle that is too large or too small, Recalc will adjust it appropriately. If it can't set up an allowed size by changing just the third most recently clicked setting, then it will try to change the second most recently clicked setting instead or as well. If it has to it will change your most recently changed setting.

Recalc will also factor in granularity and positioning requirements as required.

In the Default Output Size group, Recalc will change the default output size if Auto Size is checked. If Auto Size is not checked, Recalc will leave the output size alone.

1. Tip: The crop width and height are subject to the granularity requirements of the selected video format, as explained in the previous section. For example, if your video format is I420 and you try to set a crop width of 360, it will get adjusted down to 352.

2. If you enable cropping, key in some custom settings, and then disable cropping, an uncropped specification will be displayed and your settings will disappear from view. However, the driver does remember your custom settings, and if you enable cropping again, they will reappear.

3. Versions 4.2.0 and later of the Osprey AVStream driver can upscale cropped video, up to the reference size.

4. Cropping rectangles are frame-based rather than field-based. Thus if a crop rectangle is set up defining a 320x240 area, then a capture of video sized at 320x240 will result in video being captured from two fields. You may therefore see interlacing artifacts in the captured video, unless a deinterlacing filter is applied. This may be initially confusing since most users typically think of 320x240 video capture only coming from a single field and thus would not have interlaced artifacts. However, in this case, the source video is only 320x240 in size (i.e. the crop rectangle) and thus any captured video that is greater than the field height within the crop rectangle (equal to ½ cropped ROI height) will result in a scaled capture of multiple fields. Also, the driver will use both fields whenever they are needed to interpolatively scale the output with best possible accuracy.

Default Size

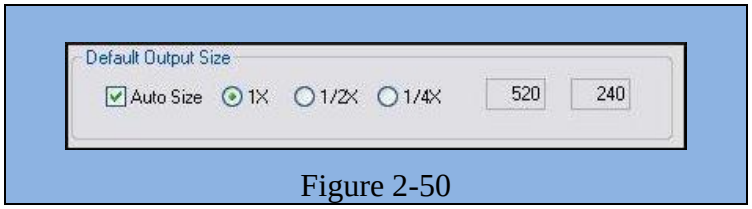


Figure 2-50

The standard DirectShow Properties dialog allows you to select the height and width of captured video from a dropdown list. (See Figure 2-50) The dropdown list has a particular range of choices that may or may not fit your needs. The dropdown list includes one default size that is provided by the capture driver. The Default Size control allows you to set up what default size will be shown.

If you check the Auto Size checkbox, your default video size will be automatically sized to your crop settings. The three radio buttons, 1X Crop, 1/2X Crop, and 1/4X Crop, determine whether the output size is scaled down from the crop size.

Example 1: If you are running standard 640x480 NTSC video, and the Enable Cropping checkbox is not checked, your crop size is 640x480. With Auto Size checked, and the 1X Crop radio button selected, your default size will be 640x480; with 1/2X Crop, 320x240; and with 1/4X Crop, 160x120.

Example 2: If you have enabled cropping with size 320x240 (one quarter of the full video area), the default Auto Sizes are as follows: 1X, 320x240; 1/2X, 160x120; 1/4X, 80x60.

If you leave Auto Size unchecked the default size radio buttons are disabled and the height and width edit boxes are enabled. You can set any default size with the following two restrictions:

1. Since the driver does not upscale video, the default size must be smaller than the crop size. For example, if the crop size is 320x240, you cannot set default size 400x300.

2. Sizes are subject to the granularity requirements of the selected video format, as explained in the Granularity section above. For example, if your video format is I420 and you try to set a default width of 360, it will get adjusted down to 352 as soon as you click on another control.

Pin Properties dialog default entry does not appear in the default VFW/DirectShow mapper dialog. Thus, unless a VFW application, like Virtual Dub, specifically allows for custom resolutions, the VFW app will only be able to select from the options the VFW/DirectShow mapper lists.

CHAPTER 3

AVStream Driver Reference Information

Overview of Filters, Pins, and Properties

DirectShow technology uses terms with specific meanings. For example, filter, pin, driver and device appear frequently when discussing DirectShow media standards. The Figure 3-1 depicts the relationship of DirectShow terms as they apply to Osprey hardware and drivers.

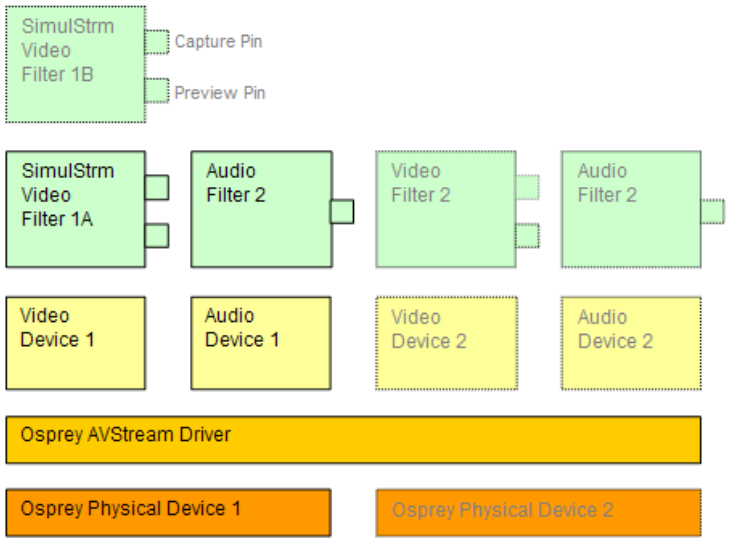


Figure 3-1

At the bottom this diagram are one or more physical Osprey hardware devices. All Osprey devices of a given type (such as Osprey-230 or Osprey-560) are controlled by a single Osprey binary, the Osprey AVStream Driver. For each physical device the AVStream Driver creates one logical Video Device and one logical Audio Device.

On top of each Osprey logical Video Device, one or more Video Filters is created. If the SimulStream option is not installed, there is a single Video Filter for each Video Device. If SimulStream is installed, there can be multiple Video Filters for each Video Device

The distinction between "Device" and "Filter" is important mainly to SimulStream users. For non-SimulStream users, Device and Filter effectively mean about the same thing. For SimulStream users, each SimulStream Filter acts as a "virtual device" that can be accessed by name and can deliver a separate video stream with its own independent control settings.

When SimulStream is enabled, some functions and capabilities are device-level, and others are filter-level. Examples of device-level functions are input select, and the controls for brightness, contrast, hue, saturation, and sharpness. These are closely tied to the underlying hardware of the device, which inherently allows only one input to be selected at a time, and one set of hardware control settings to be applied. Examples of filter-level functions are crop, logo, and caption settings, which can be different for each video filter, and in fact for each pin of each filter. Some other capabilities such as deinterlace and software gamma correction could logically be either device-level or filter-level, but are treated as device-level for practical reasons.

Each Video Filter has one Capture Pin and one Preview Pin. A "pin" is the source or destination of a video or audio stream. A video capture pin is a general purpose pin used for capture to a file, an encoder, an on-screen renderer, or any other destination. A video preview pin is mainly intended for on-screen rendering. Each Osprey Video Filter also has a Closed Caption pin and a Vertical Blanking Interval (VBI) pin for capture of specialized ancillary data.

On top of each Osprey logical Audio Device, one Audio Filter is created, with one or more pins capable of sourcing one or more audio streams. There is not much practical distinction between an Audio Device and an Audio Filter in either the SimulStream or non-SimulStream cases.

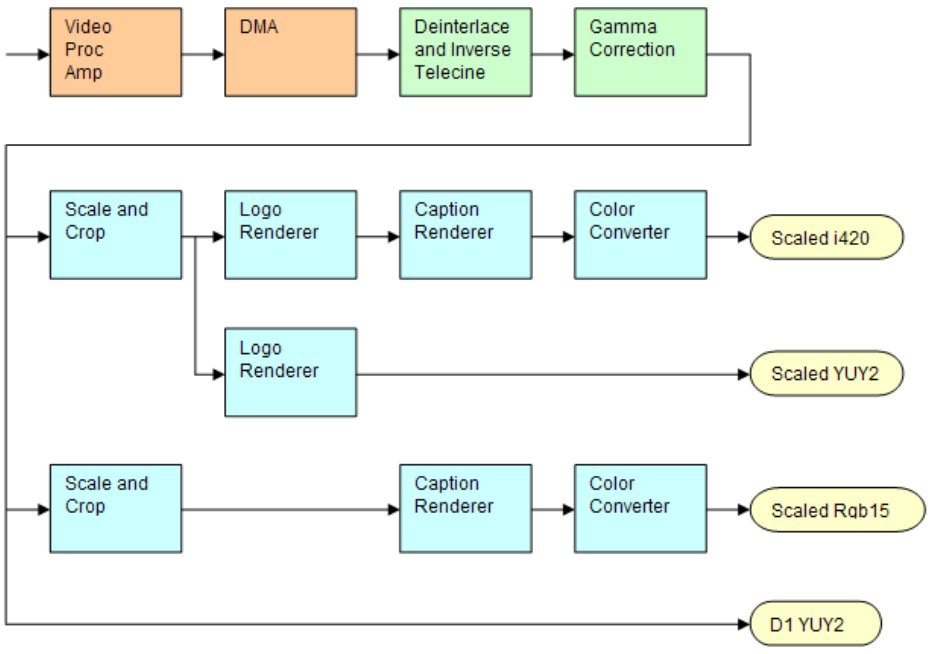
Both devices, filters, and pins may have associated "Properties." "Properties" are control parameters that can be read from or written to the component. Some Property Pages are standard Windows DirectShow pages. For example, the Property Page for an individual pin is a standard DirectShow page. The "Video Proc Amp" and "Video Decoder" Pages are also DirectShow-standard. The rest are proprietary to the Osprey driver.

As a user, you interact with Property though visual "Property Sheets," "Property Pages," or "Property Tabs" that are part of a tabbed dialog. As a programmer, you can set properties directly from within the code of your application, using either the standard DirectShow API or the custom Osprey extension API that is available from ViewCast Corp in an SDK.

Overview of PostProcessing Mode

PostProcessing Mode

The Osprey-240/450e 4.2 driver operates in Postprocessing Mode only. PostProcessing Mode enables a number of filters, transforms, and renderers within the driver, and supports the SimulStream option.



The drawing shows a possible graph of video data flow within the driver in PostProcessing Mode. This particular graph assumes that SimulStream is activated so that more than two video pins are possible. There are four video output pins, represented by the pale yellow round rectangles:

The upper pin produces scaled and/or cropped I420 video, with a logo (bug) and Closed Captions rendered on the video.

The second pin produces scaled and/or cropped YUY2 video with a logo but no captioning. In this particular graph, the upper two pins are scaled and cropping identically, so a single scaling operation can service both pins.

The third pin has a different scale/crop specification, so its video runs through a separate scaler/cropper. The video is captioned and converted to Rgb15.

The lower pin produces unscaled, uncropped D1 YUY2 video with no logo or captioning.

The video routed to all pins is in this example deinterlaced and gamma-corrected. Deinterlace or inverse telecine if used are always applied globally to all pins, as is gamma correction. Scaling, cropping, logoing, captioning, and color format conversion are performed separately for each pin.

Postprocessing Mode has the following capabilities:

1. With SimulStream disabled, there is still a maximum of one capture pin and one preview pin on the device at a time. However, there are no restrictions on combinations of video size and rate, color formats, or crop settings. The driver will color convert and copy video as required to deliver up to 25 or 29.97 frames per second in any format to the two pins.

2. With SimulStream enabled, there can be multiple capture pins and multiple preview pins. Each capture and preview pin pair is placed on a separate filter. The maximum number of each type of pin is the same as the maximum number of filters you have elected to expose in the SimulStream control group. Any pin can produce video at any size, rate, color format, and crop setting. Of course, there will be practical limits imposed by the bandwidth of the machine.

3. The following post processing filters can be applied, with or without SimulStream enabled:

    - motion adaptive deinterlacing and inverse telecine
    - gamma correction
    - logos
    - on-video caption rendering

Some of these filters operate globally on all filters and pins of a device, and some operate on a per-filter or per-pin basis:

The Video Proc Amp controls – brightness, contrast, hue, saturation, and sharpness – are applied globally in hardware to the incoming video.

The basic reference size – CCIR–601 or square pixel – is established in hardware. Horizontal delay is also performed in hardware.

Deinterlace / inverse telecine and gamma correction are applied to all filters and pins on the device and have the same settings for all filters and pins. (Adaptive deinterlacing does not affect quality of single field 2:1 or 4:1 exact-scaled video, so long as the “sharp” algorithm is used. Inverse telecine does not affect single fieldexact-scaled video.)

Crop, logo, and caption settings can be different for each pin of each filter, and the driver maintains separate settings for each filter and pin.

Video size, color format, and frame rate can also be different for each pin. It is the responsibility of the application to maintain these settings.

Efficient Video Rendering

The following information is primarily useful to developers, but may also be helpful for those who want to fine-tune existing applications. If you are seeing poor rendering performance, in terms of either excessive CPU utilization or jerky, stuttering video, read this section.

There are at least four basic ways to render video from the capture driver onto the screen. They vary greatly in their efficiency, and applications do not always make the best choice of renderer.

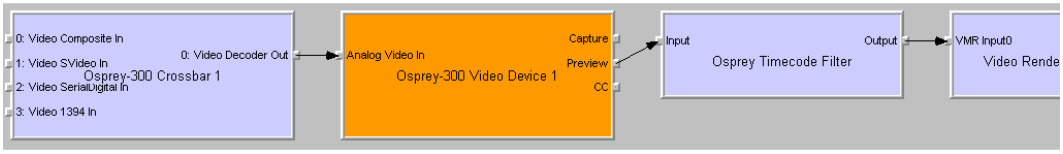
In these descriptions it is assumed that the AVStream driver's Preview Pin is being used. The results would be the same if the Capture Pin were used instead.

Preview Pin to Video Renderer

"Video Renderer" is the oldest and simplest DirectShow renderer. It does not use DirectDraw in the rendering process, which makes it substantially slower than VMR7 described below. It is the default rendering pathway that will be chosen when an application says "Render" without specifying a preferred pathway. For this reason, many applications deliver unnecessarily slow rendering performance.

Video Renderer works best when your output format is RGB rather then YUV, with the RGB format matched to your screen depth. On most modern systems that means RGB32 is the preferred format. If a YUV format is used, an extra filter, "AVI Decompressor" will be inserted into the graph to convert the YUV to RGB. The driver can do this conversion faster internally.

Preview Pin to Overlay Mixer to Video Renderer



Compared to a direct connection of Preview Pin to Video Renderer, the combination of Overlay Mixer plus Video Renderer provides performance that is …different. It is hard to be more specific than that without reference to specific machines; refer to the data tables below.

This is the only pathway that renders closed captioning correctly when a DShow CC or VBI pin is used rather than the driver's internal rendering. For CC rendering, the output of the Line 21 filter connects to an input of the Overlay Mixer.

The best video format to use with Overlay Mixer is YUY2.

Preview Pin to VMR7

VMR7 is short for "Video Mixing Renderer 7." VMR7 is a newer renderer that is generally much faster than the old Video Renderer. When the driver is running in Direct Mode, VMR7 uses an efficient DirectDraw configuration to render with almost no CPU overhead, especially when YUY2 video is used. When the driver is running in PostProcessing Mode, DirectDraw is not used but it is still the fastest renderer.

Unfortunately, VMR7 is not the default video renderer in building a filtergraph – an application must explicitly ask for VMR7 in its graph in order for it to be used. This causes many simpler applications to render video much less efficiently than they might.

VMR7 works best with YUY2 video and there is usually little reason to use any other format. It will, however, work fairly well with the RGB format – usually RGB32 – that matches the current screen depth. We recommend letting DirectShow choose the video format. It will generally make the correct choice. In particular, on some (usually older) systems, if two video frames are to be rendered with VMR7 at the same time, only one can be YUY2; other(s) will be RGB, with a conversion filter inserted into the graph if necessary.

We do not provide an RGB24 option on the preview pin for use with 24-bit screens because on at least some display adapters the rendering of RGB24 to VMR7 is incorrect.

Note that VMR7 cannot be used when closed captions are to be rendered from the driver's DShow-standard CC or VBI pin – use the Overlay Mixer to Video Renderer pathway instead. If the driver's internal rendering is used, the VMR7 will work and is recommended.

Preview Pin to VMR9

Video Mixing Renderer 9 is the newest video rendering method and the one on which Microsoft supposedly will base its future development. The intent is to combine the functionality of the Overlay Mixer plus Video Renderer in one module that takes advantage of the latest developments in DirectShow. We are finding that at its present stage of development, with our hardware, VMR9 does not achieve the very high efficiency of YUY2–to–VMR7. Also, although VMR9 is supposed to function as an overlay mixer for rendering captioning from the driver's DShow CC or VBI pin, we have never seen it function correctly.

Some Data Points

The following measurements are CPU percent on two machines – a fairly old P4, and a dual Opteron 244. The video size is 640x480. The screen depth is 32 bits. The following abbreviations are used:

YUY2 = the Osprey driver's preview pin in YUY2 format

RGB15 = the Osprey driver's preview pin in RGB15 format

RGB32 = the Osprey driver's preview pin in RGB32 format

VR = old Video Renderer

VMR7 = Video Mixing Renderer 7

VMR9 = Video Mixing Renderer 9

AVI = AVI Decompressor

OVL = Overlay Mixer

The PostProc results are shown in two modes: with all post processing filters turned off, and with the adaptive deinterlace filter turned on.

Generally these results show the following:

1. The great desirability of newer machines for video processing. This has to do with system architecture more than raw CPU speed.

2. VMR7 is generally fastest. If you don't need the driver's PostProcessing, then Direct Mode with VMR7 is especially fast.

3. Results for specific pathways can be inconsistent across different machines. For example, on the P4, YUV to VR is faster than RGB to VR; on the Opteron, RGB is faster.

In evaluating these benchmarks, bear in mind that all of them involve video rendering to the screen. Depending on the exact pathway, video rendering can result in CPU utilization that is a lot higher than for other capture scenarios. Specifically, writes to display adapter memory that are performed by the CPU rather than with direct memory access (DMA) operations may be inordinately slow. If you are streaming video or capturing to file you will not see numbers that are this high. If you are encoding video, you may see high CPU utilization, but much or most of it will be from the encoder rather than the driver.

Dual Opteron 244, 1.8 GHz, 3GB, NVIDIA GeForce 6600 PCIe x16

Rendering Pathway	PostProc w/o Deilace	PostProc w/ Deilace
Video Renderer		
RGB15 -> VR	13%	16%
RGB32 -> VR	10%	13%
YUY2 -> AVI -> VR	12%	13%
YUY2 -> OVL -> VR	18%	20%
VMR7		
RGB32 -> VMR7	25%	26%
YUY2 -> VMR7	8%	10%
VMR9		
YUY2 -> VMR9	13%	15%

P4, 2.0 GHz, 512MB, Rage Fury Pro/Xpert 2000

Rendering Pathway	PostProc w/o Deilace	PostProc w/ Deilace
Video Renderer		
RGB15 -> VR	44%	52%
RGB32 -> VR	44%	50%
YUY2 -> AVI -> VR	49%	56%
YUY2 -> OVL -> VR	55%	62%
VMR7		
RGB32 -> VMR7	54%	61%
YUY2 -> VMR7	39%	43%
VMR9		
YUY2 -> VMR9	47%	52%

Video Standards and Sizes

Video Standard refers to whether the video signal format is NTSC, PAL, or SECAM. Depending on the exact product version you have, some or all of the following standards will be available:

525-line formats:

NTSC-M – North America

NTSC-J – Japan

625-line formats:

PAL-B, D, G, H, I – many countries in Europe and elsewhere. B, D, G, H, and I refer to five nearly identical subformats.

Full-sized NTSC-M and NTSC-J have 525 lines total, 480 lines visible, per frame and a display rate of 59.94 fields per second, or 29.97 interlaced frames per second. Although capture-to-PC applications normally use only 480 video lines, the full NTSC frame actually contains 485 video lines, and the AVStream driver provides a control to capture all 485 lines. The control is located on the RefSize property tab.

Full-sized PAL and SECAM have 625 lines total, 576 lines visible, per frame and a display rate of 50 fields per second, or 25 interlaced frames per second.

The standard frame sizes are different for NTSC and PAL. For example, the half-frame size in pixels is 360x240 for NTSC, and 360x288 for PAL. The driver automatically adjusts the reference size and default size for the video standard you are using.

Color Formats

The Color Format is the arrangement of data bits representing the colors of each pixel. For example, in the RGB555 format, each pixel of data is stored as 5 bits of red, 5 bits of green, and 5 bits of blue color information.

Video delivered by the Osprey board to the system is in uncompressed format. It is possible to compress the video at a subsequent stage of processing. However, this dialog field refers specifically to the uncompressed raw video that the board delivers to the system.

The Osprey AVStream driver supports the following capture pin formats.

YUY2 and UYVY – Each pixel is represented with a total of 2 bytes (16 bits) of data. The data is encoded as separate data for luminance (intensity) and chrominance (color). This mode is mainly used as an input to software compressors. See YUV Format Details below.

YUV12 planar – Also known as I420. This is a complex format in which there are in the aggregate 12 bits of data per pixel. Each pixel has 8 bits of luminance data. Each group of 4 adjacent pixels arranged in a 2x2 square shares two bytes of chrominance data. See YUV Format Details.

YVU9 planar – Similar to YUV12 planar, except that there are in the aggregate 9 bits of data per pixel, and each byte pair of chrominance data is shared by 16 adjacent pixels arranged in a 4x4 square. See YUV Format Details.

RGB32 – Each pixel has four bytes (32 bits) of data – one each for red, green, and blue, plus one byte that is unused. The pixel has 256 shades of each of the three colors, for a total of 16.7 million colors.

RGB24 – Each pixel has three bytes (24 bits) of data – one each for red, green, and blue. This is another "true color" mode with 16.7 million colors.

RGB555 – Each pixel has two bytes (16 bits) of data. There are 5 bits each of red, green, and blue data; the sixteenth bit is unused. This is a "high color" mode, also known as "5:5:5."

RGB8 (Greyscale) – The Osprey AVStream driver uses the RGB8 format for greyscale video. RGB8 is a palletized format. Each pixel is represented by one byte, which indexes one of 256 colors in a color palette specified by the driver. The Osprey driver sets the color palette to greyscale entries, and captures "Y8" luminance-only data.

YUV Format Details

YUY2, UYVY, YVU9, and YUV12 are YUV formats. In these formats, each pixel is defined by an intensity or luminance component, Y, and two color or chrominance components, U and V. Since the human eye is less sensitive to color information than to intensity information, many video formats save storage space by having one luminance byte per pixel while sharing the chrominance byte among two or more pixels. YUV is also very similar to the color encoding used for analog color television broadcast signals.

YUY2 mode, sometimes referred to as 4:2:2 packed mode, consists of a single array of mixed Y, U, and V data. Each pixel has one Y (intensity) byte. Each pixel shares its U and V bytes with one of the pixels horizontally next to it.

YUY2 uses the same number of aggregate bytes per pixel as RGB15, which is two. However, YUY2 is more efficient than RGB15 because it stores relatively more of the intensity information to which that the human eye is most sensitive.

UYVY mode is very similar to YUY2 except that the bytes are swapped as follows:

YVU9 and YVU12 are "planar" modes – the Y, U, and V components are in three separate arrays. It is easiest to explain the format with an example: Let's say you have a 320x240 YVU9 format. The buffer has 320x240 bytes of Y data, followed by 80x60 bytes of V data, followed by 80x60 bytes of U data. So each U and each V byte together contain the color information for a 4x4 block of pixels.

Similarly, a 320x240 YUV12 format has a 320x240 Y array, followed by a 160x120 U array, and then a 160x120 V array.

Note that in the I420 format used by Osprey, the order of the U and V arrays is reversed from the order in the YVU9 format.

Closed Captioning (CC)

The Osprey AVStream driver supports NTSC closed captions in three separate ways.

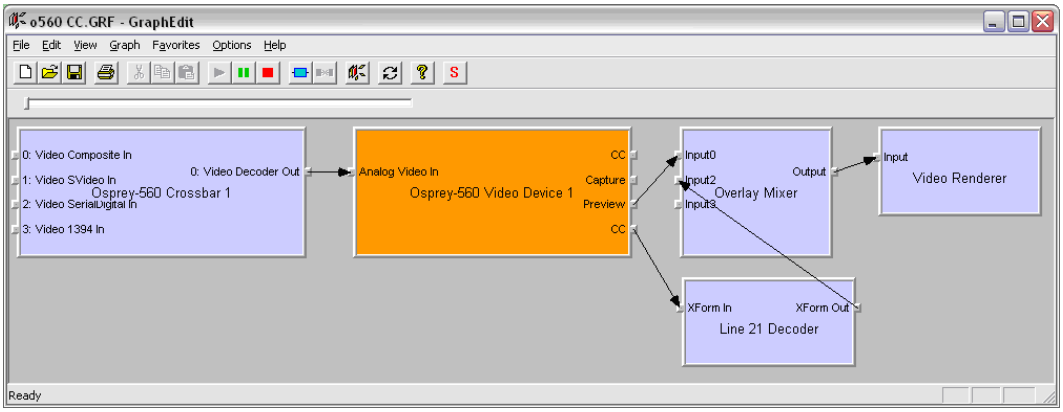
1. Through standard DirectShow CC and VBI pin.

2. By rendering captions directly onto video on the capture or preview pin. The captioned video can be streamed, written to file, or rendered directly.

3. Through an Osprey custom property.

On products other than the Osprey-530/540/560, the driver also provides PAL/SECAM captions as well as teletext data in raw form via the VBI pin (not through the CC pin). Refer to the next section on Vertical Blanking Interval (VBI) Capture for more information. The rest of this section is specific for NTSC captioning only.

Captioning via CC or VBI Pins



The driver supports the standard DirectShow CC and VBI pins. The CC character pair data can be streamed to applications such as Windows Media Encoder 9, or rendered directly to the screen using the DShow Overlay Mixer filter. The 4.2 driver can be set to output CC field 2 character pairs on the CC pin, instead of the standard CC field 1 data. XDS (vchip) data is embedded in the field 2 stream.

The GraphEdit filtergraph shown here displays CC on rendered onto preview video. The Overlay Mixer combines the CC overlay with the preview video, which is then rendered onscreen. It is also possible to capture the character pair stream as a standard stream of an avi file, (although there will be problems with timestamping and synchronization); or, to directly manipulate the CC stream in a standard way with a custom application.

Our testing with the current version of DirectX 9 indicates that closed captions do not render properly with the VMR9 renderer in place of the Overlay Mixer / Video Renderer combination. Therefore, the default Video Renderer in combination with Overlay Mixer should be used.

When SimulStream is not installed, the driver supports two CC pin instances. One could be associated with the video capture stream, the other with the preview stream. In practice, a DirectShow Smart Tee Filter can be inserted into the graph to make any number of VBI pins. When SimulStream is installed, you can have two CC pin instances per SimulStream filter.

There are three user-accessible controls built into the driver that affect Closed Captioning.

1. On the RefSize property page, in the control group shown below, 480-line video must be selected and the radio button to start video at either “Lines 23/286” or “Lines 22/285” must be selected.

2. On the Captions property page, most of the controls relate to the driver's internal direct rendering on video. The following control selects field 1 or field 2 as the field to be streamed through the CC pin. This control is per-filter; both available pins on the filter are set the same way. For SimulStream users, the pins on different filters can have different settings.

3. On the Device -> Extras… property page, you have the choice to set with "Normal" or "AVI-Compatible" timestamping of Closed Caption samples.

This control is a workaround to what an apparent problem in DirectShow – if you attempt to capture a CC character pair stream to an AVI file with "Normal" timestamping, the file will become extremely large and the capture will fail within a few seconds. The "AVI-Compatible" mode allows capture of CC to AVI. Unfortunately, the problems with timestamping mean that time synchronization between the video and CC streams depends on their physical interleaving in the file, so that time synchronization will be poor. If the AVI file is set up to be "non-interleaved," synchronization is not very good. If the AVI file is set up to be "interleaved," synchronization is very poor.

For all applications other than capture to AVI, this control should be set to "Normal." WME9 among others requires the "Normal" setting if CC is used.

Windows Media Player will not play back an AVI file with an embedded CC stream. The following GraphEdit filtergraph will play back an AVI file containing a video stream plus a CC stream, with the CC rendered on the video:

Direct CC Rendering on Video

The driver can render closed captions directly onto capture or preview video. The captioned video can be encoded, written to file, or rendered directly to the screen. The driver has to be in PostProcessing Mode.

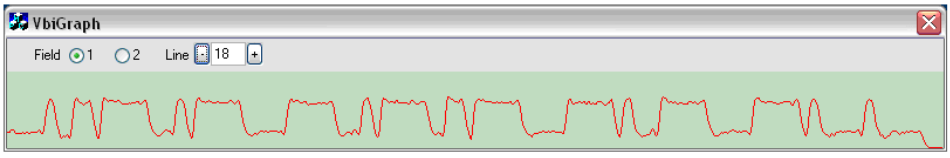
CC Streaming Interface

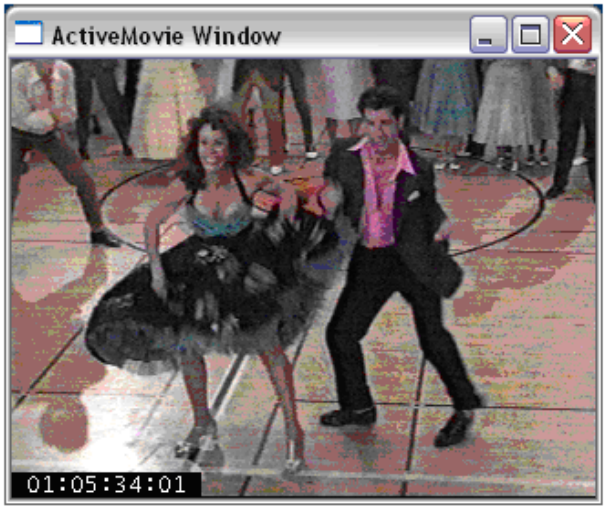
The driver supports an Osprey custom property which provides the closed caption character stream for use by custom applications. The Osprey filter named CCLineInterp.ax, supplied with the driver package, provides user-mode support for this captioning mode. The Osprey sample applet named CCChannels.exe, also supplied with the driver package, demos a CC line interpreter and XDS (vchip) extraction and display. Refer to the description of CCChannels.exe in chapter 5. Refer to the documentation for the Osprey AVStream SDK, version 4.2, for a description of this interface for developers. Both the filter and the applet are provided in source code form in the SDK.

Vertical Interval Timecode (VITC)

Vertical Interval Timecode (VITC) data is embedded in the Vertical Blanking Intervals (VBIs) of some video content. Timecodes mark each frame with an hour / minute / second / framenumber marking that can be use for frame-precise editing.

The illustration below shows a VITC timecode waveform.





The current Osprey VITC implementation is preliminary in nature. The features and method of implementation are subject to change. We invite comments on the timecode-related capabilities that you need for your application.

Osprey's approach to VITC is to invisibly watermark the video bits of each outgoing video frame with its timestamp data. The illustration shows a timecode extracted from a watermarked frame and rendered as text on the video. Four elements are used to produce it:

The device extracts timecode data from the vertical blanking interval (VBI) waveform.

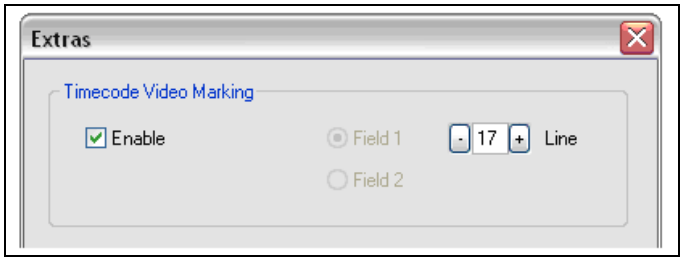
The driver watermarks timecode into the video preview or capture pin's output data.

A custom filter decodes the watermark from the video and renders it.

A GraphEdit graph combines the required filters. The filtergraph is as follows:

The Osprey Timecode Filter resides in the module TCOverlay.ax and is installed and registered as part of the standard driver installation. The source code for this filter is included in the Osprey AVStream SDK.

The Osprey Timecode Filter also exposes to applications a custom property and callback function that allows it to return the VITC data for each frame along with the frame's timestamp to the application. Since use of this capability requires custom programming it will not be further discussed here. Refer instead to the Osprey AVStream SDK Users' Guide. A sample SDK applet named TCApp illustrates the interface.



Timecode stamping must be enabled in the driver before it can be used, and the field and line number correctly set. To access the controls, go to the Device property tab and click the Extras… button.

It is recommended that timecode marking be disabled when not in use, especially the auto search feature – on a slow machine it uses several percent of CPU bandwidth – especially if timecodes are not present.

Note that VITC and LTC – Longitudinal Timecode – are two distinct encoding systems, and this driver supports only VITC.

A suggested reference on timecode is Timecode: a user's guide – 3rd ed., John Ratcliff, Focal Press, 1999.

Vertical Blanking Interval (VBI) Capture

The Osprey AVStream driver provides DirectShow-compatible VBI pins. VBI data includes Vertical Interval Timecode (VITC) in both the NTSC and PAL worlds. In NTSC, line 21 Closed Captioning, although it is strictly speaking part of the video interval rather than true VBI data, is commonly treated as VBI data. In PAL, World Standard Teletext (WST) is encoded in the VBI data region.

The illustration above shows an NTSC CC waveform. This illustration is made using the VbiGraph sample app that is included with the driver and also available in source form in the Osprey AVStream SDK.

The driver delivers VBI data as raw waveforms, which are then decoded by external DirectShow filters. DirectShow provides three filters under the classification "WDM Streaming VBI Codecs" that will decode data from VBI pins:

CC Decoder

NABTS/FEC VBI Codec

WST Codec

With the Osprey AVStream driver, either the CC pin or the VBI pin can be used to obtain closed caption data. If the VBI pin is used, an extra filter is required to turn the raw waveform into CC character pairs. The filtergraph below shows NTSC CC using the VBI pin; the graph in the CC section above shows CC from the CC pin; in the graph below, a CC Decoder filter must be inserted into the graph.

For PAL/SECAM, the following graph will display teletext and CC. (In this graph, to view CCs you have to select the CC page – probably page 801 – in the WST Decoder properties.)

When SimulStream is not installed, the driver supports two VBI pin instances. In practice, a DirectShow Smart Tee Filter can be inserted into the graph to make any number of VBI pins. When SimulStream is installed, any number of VBI pins are allowed.

CHAPTER 4

The Audio Driver

Setup and control for audio are much simpler than for video. The basic steps are covered in the following topics:

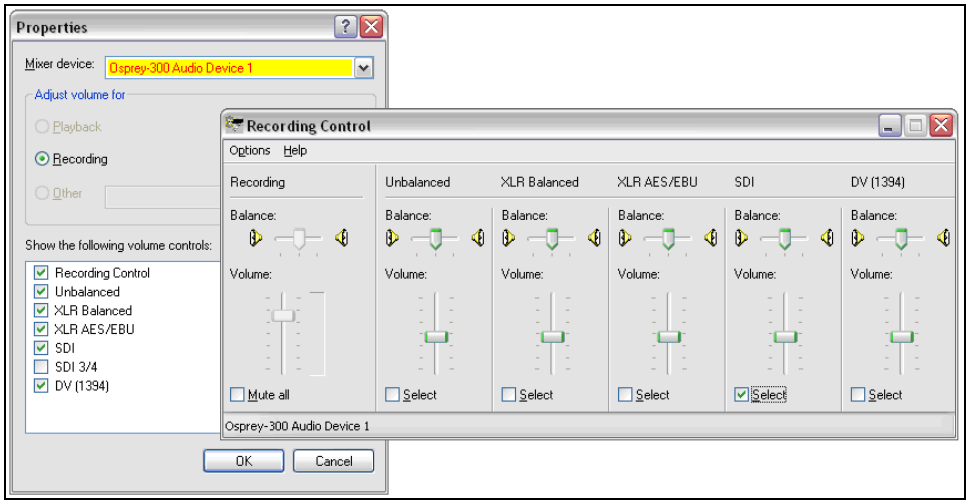
Selecting the Audio Source and Input Volume

The audio source is set using the Osprey mixer driver interface. Most applications, including the Windows Media Encoder applications, interface to the mixer driver directly and expose the look and feel specific to that application. However, the default Windows interface to the mixer driver can also be used. There are two simple methods for getting to the mixer source and volume control dialog box.

1. The easiest method for accessing this interface is to right click the speaker symbol on your taskbar (typically on the bottom right-hand side of your screen). Then select the Open Volume Controls option. (There is a checkbox in Control Panel -> Sounds and Audio Devices to make this icon appear.)

2. If you do not see the speaker symbol, click the Start button on the Start Menu, select Start -> All Programs -> Accessories -> Entertainment -> Volume Control.

Either of these two methods brings up the audio mixer interface for the audio playback device, as shown below.



To get to the Osprey audio capture (recording) device, select Properties under Recording Control's Options menu. This pops up the Properties dialog. Click on the Mixer device list at the top to see the list of audio input and output devices, including one or more Osprey cards. When you have chosen the device, click OK, and you will be returned to the Recording Control display.

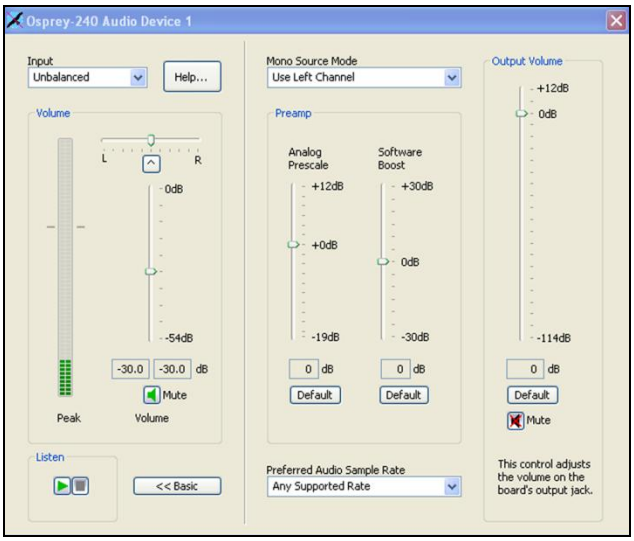
The Osprey device is not a mixer in that it does not allow for mixing the various audio sources. Therefore, when one audio input is selected, any other input previously selected becomes unselected. The Select checkbox at the bottom of each source sets which source is actually being used.

Osprey cards have hardware gain control. To control hardware gain use the volume slider in the mixer applet. The unity gain setting is when the volume slider is all the way up (in default driver settings).

The quick-access volume control (left click on the speaker symbol) on the task bar controls recording volume and playback volume. To change record levels, go to Options, then Properties, and select Recording.

The Audio Properties Page

Many applications, including Windows Media Encoder, display the illustrated property dialog for setting audio source and volume level. This is a general-purpose DirectShow property page that our driver has to support but which is not quite intuitive in its operation.



To select the audio source using this dialog, select the desired input in the "Pin Line:" selection box, then check "Enable." This will also deselect whichever input had been previously selected.

The confusing part comes up when you select any input other than the first on the list, which happens to be "Unbalanced." Let's say you select "XLR Balanced." When you close and reopen the dialog it will show "Unbalanced" in the selection box. It will look like the selection has been lost, but then you will notice that the "Enable" box is not checked. If you again select "XLR Balanced," the "Enable" box will automatically show up as checked.

This property page makes more sense if you understand that it is designed to allow mixing of audio inputs for devices that support that. Osprey audio capture filters do not support mixing of inputs – you have to select one stereo input at time – so the DirectShow design is not very convenient in our case.

Audio Formats

The Osprey hardware supports sampling of analog audio at 32, 44.1 and 48 kHz in 16-bit PCM format. Captured audio data is down-sampled and reformatted if necessary by Microsoft system audio components, allowing an application to capture audio data in 8-bit and 16-bit mono or stereo formats at any of the following data rates:

8 kHz

11.025 kHz

16 kHz

22.05 kHz

32 kHz

44.1 kHz

48 kHz

Audio Playback

Osprey cards provides audio capture only, not audio playback. Continue to play back captured audio using your system soundcard.

Audio Configuration

The OspreyConfig applet is included as part of the Osprey AVStream driver package. It is also provided in source form in the Osprey AVStream SDK. It provides supplementary controls that are not available via the standard system properties.

OspreyConfig's controls are device-specific and apply only to Osprey audio capture devices. Use the Device menu list at the top of the applet's window to select which device you are controlling.

Preferred Audio Sample Rate

The audio sample rate is the rate at which the hardware samples the incoming audio, which may differ from the sample rate delivered to the client application.

The choices are to allow "Any Supported Rate," or to force the sampling rate to be 32 kHz, 44.1 kHz, or 48 kHz. If "Any Supported Rate" is selected, all three rates, 32, 44.1, and 48 kHz, are available for selection by the Microsoft kmixer driver. Kmixer, however, does not necessarily select the optimum hardware rate for a given software rate. It may specify a 44.1 kHz hardware rate when a supplying 16 kHz software rate to the application, for example. In this case it would be better to set the Preferred Audio Sample Rate 32 kHz, so that downsampling is exactly 2:1.

Mono Source Mode

If set to Use Left Channel, then left channel audio data is copied to the right channel.

If set to Use Right Channel, then right channel audio data is copied to the left channel.

If set to Average Left and Right, no copying is done.

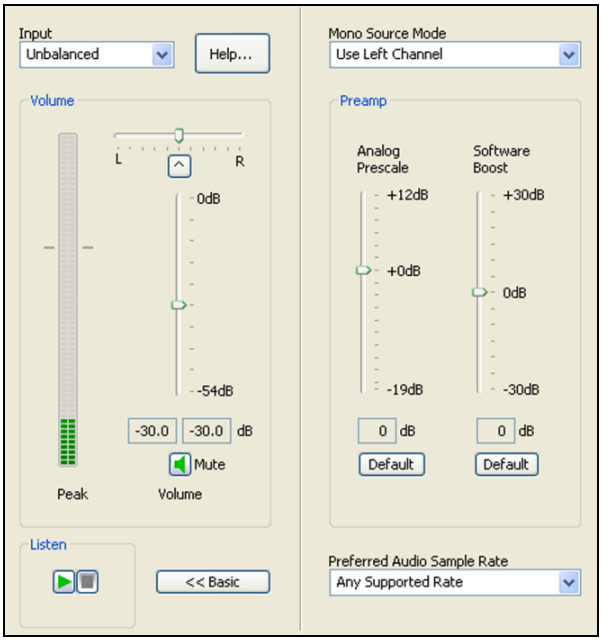
The Microsoft kmixer component always averages both channels when converting to mono. If a signal is present on, say, the left channel only, the Average mode will average the left channel with the silent right channel, effectively halving the signal amplitude. Setting this control to Left will result in only left channel data in the mono capture, with no amplitude drop.

Audio Level

This control sets the hardware Input Reference level and software-based Boost factor. The settings are separate for each input of each device, and are applied to whichever input is selected in the current application or in the system mixer. The settings displayed do NOT automatically update when you change inputs in the application or mixer click the "update" button to refresh the settings.

As the screenshot above shows, the Audio Level control is different depending on which input is selected.

The Input Reference level is meaningful only on the analog unbalanced and balanced inputs, and is calibrated differently for each when a digital input is selected this control is disabled. This is a hardware gain control with the default level chosen such that the expected amplitude of a full volume input signal will have adequate headroom without clipping. If you do experience clipping, or are working with very low-level signals, you can adjust this level. On this control, a higher reference level results in lower gain, so the quietest setting is at the top of the scale. Click the "Dflt" button to restore the default value.

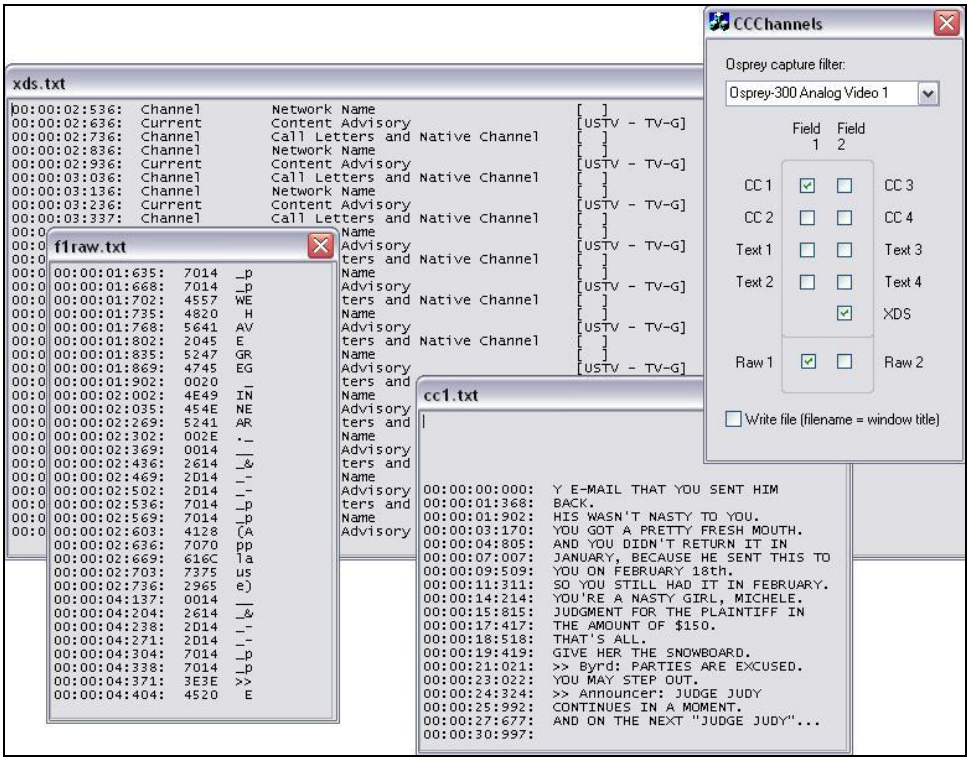


The Boost setting is a software gain adjustment that applies to both analog and digital inputs. Boost can be set individually for each input. It supplements the system mixer volume controls by providing a very wide adjustment range. You can use it to calibrate or normalize input levels across multiple inputs; or to accommodate microphones or other non-line inputs that have nonstandard signal levels. Again, there is a "Dflt" button to restore the default value.

CHAPTER 5

Osprey Applications

CCChannels



CCChannels displays closed caption and XDS (vchip) data.

Check the CC1 box to open a window displaying captions as lines of text. There will be a line break between pop-on captions. There will not be line breaks between successive lines of rollup captions. CC2, CC3, CC4 and the Text channels are not often used.

Check the Raw 1 or Raw 2 box to view the raw uninterpreted character pairs from field 1 or field 2 respectively.

Check the XDS box to view interpreted field 2 XDS data. The fields at the left of the display show the category of the messages. The text in brackets at the right shows the data of the messages.

Saving to file: In order to get text saved to file, you have to check the Write file box before opening the streams. The text files will be named cc1.txt, text1.txt, f1raw.txt, and xds.txt and so forth, and the files will be placed in the directory where CCChannels.exe is located. If a file already exists it will be appended to always.

How to test XDS: If a channel supports XDS at all, there will always be content advisory information that is readily understandable. There will be other fields that may or may not make much sense. The main test is whether

the XDS interpreted text is grouped into well-formed lines with messages that appear that they could make sense to whoever they are meant for.

CCChannels is a demo app for the underlying filter CCLineInterp.ax. CCLineInterp uses the Osprey-proprietary CC streaming interface new to the 4.2 driver to obtain a stream of CC character pairs (or two streams, one from each field). CCLineInterp interprets the CC stream in any of three ways:

1. It can pass through the raw CC stream from Field 1 and/or Field 2.

2. It can split off any of the eight CC or Text channels and interpret it into ASCII lines of plain text. It can return multiple channels at once, and the driver can support multiple instances of the filter running in multiple process spaces.

3. It can extract XDS data from Field 2 and return it as XDS packets. CCLineInterp splits out the individual packets but does not decode them in any way.

CCChannels provides a thin encapsulation of the raw and CC line streams from CCLineInterp. It mainly just prepends the timestamp returned with each line of interpreted text. CCChannels provides a more extended interpretation of most of the XDS packet types, as in the xds.txt window in the illustration. If the "Write file" checkbox is checked before a stream is opened, the text as shown will be save to file.

CCLineInterp.ax is ready to use as-is if the interpretation format suits your application. Otherwise you may want to modify the CC interpreter. The source file CCChannel.cpp contains a complete line-oriented interpreter. It preserves horizontal text placement. It discards vertical text placement, and text modifiers including colors, italics, and underlines. It translates non-ascii special characters into approximate ascii equivalents where possible. It delimits pop-on captions (movie-style, as opposed to news-style) with an extra blank line between each pop-on.

For more detailed information on the US Closed Captioning standard, refer either to the standards document (CEA-608) or The Closed Captioning Handbook by Gary D Robson, Elsevier / Focal Press, 2004. Compared to the standards document, the book is more accessible, cheaper, and contains all the required technical information if you are willing to read between the lines a bit to get it.

CropApp

CropApp allows you to set up crops visually and interactively. Its functionality is similar to the driver's Size and Crop property page, but it has the added dimension of graphical placement of the cropping rectangle on live video. It has about the same functionality as SwiftCap's crop setup dialog.

The functions of the controls on the left hand side of the video are as follows:

If multiple Osprey devices are in the system, you can select the device of interest from the dropdown list at the top of the control groups. Click "Device Properties…" to access controls that are not explicitly addressed by CropApp.

All operations affect both the Capture and Preview pin on the device. The driver's Size and Crop property page is capable of setting the Capture and Preview pins differently. If SimulStream is enabled, CropApp is hardwired to set up pin pair 0 only – to set up other pins you will have to go to the driver's Size and Crop property page.

The Reference Image group shows the video height and width that are the reference size for cropping operations. For example, if the reference size is 720x480 and the cropping spec is 720x480, then the video is effectively uncropped. This group also states the basis for this reference size – that is, whether the video standard is NTSC (720x480) or PAL/SECAM (720x576).

The Cropping Parameters group is where the current cropping parameters are shown. When the Enable button is Off, the entire video field is shown, with the crop as an overlayed rectangle. You can modify the crop in three ways:

By editing the X, Y, Width, and Height boxes.

With the two sets of arrows adjacent to these boxes.

By dragging the center, edges, or corners of the crop rectangle on the video.

When the Enable button is On, only the crop field is shown, and the crop settings are not editable.

CropApp will not let you set crops that are smaller than a minimum width and/or height. The minimum size in the 4.2 driver is 48 wide by 36 high.

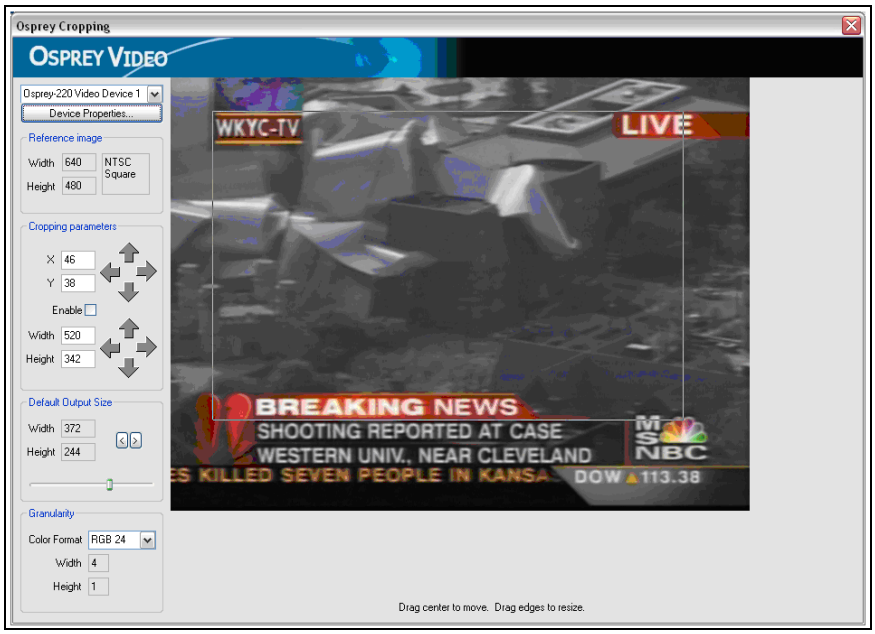
The Default Output Size group sets a default size that applications may choose. Use the slider to set the approximate size you want, and then if necessary use the [<] and [>] buttons to fine tune the setting.

The sizes available in CropApp will always retain a 1:1 height:width proportion. If you want to stretch the video to other proportions, use the driver's Size and Crop property page, or SwiftCap's crop dialog.

Not all applications use the driver's default output size or present it as a choice; you may have to manually enter the settings calculated by CropApp into the application.

The Granularity group allows you to determine the allowed sizing increments for the selected video format. For example, if you select YVU9 in the drop list, you will see that the video widths allowed in this format are modulo-16, that is, 320, 336, 352, etc., and the video heights allowed are modulo–4 – 240, 244, 248, etc. All editing of the crop size will snap to the nearest allowed size.

The left and top of the crop have to be placed on even pixel boundaries – for example, in YVU9 the width must be 320, 336, etc, and the left side must be 0, 2, 4, etc.



Selecting a format here causes CropApp to use that format for its own rendering, but it does not cause that same color format to be selected in your application. In only ensures that your crop size will work with that color format when it is used.

We are finding that the default I420 codec will not render many output sizes, so when I420 granularity is selected, CropApp will observe the I420 granularity rule but render the video as YUY2. Since you may see this problem in other applications, CropApp puts up a reminder message when it encounters this situation.

If you exit CropApp with the crop Enabled, that is, the center checkbox checked, the crop parameters will be set in the driver for any other application to use. If you exit CropApp with the crop disabled, the crop parameters will be set for other applications to use, but cropping will not be enabled until it is turned on as a separate step.

CropApp requires that the filter OverlayRect.ax be present on the system. The driver setup program installs this filter.

LogoApp

LogoApp allows you to interactively position and resize a logo on live video. The functionality is similar to that of the driver's Logo property page, but you can place and size the logo by dragging its center, sides, or corners directly on live video.

The control bar across the top allows you to Enable/Disable logo display and select the 24-bit .BMP logo file. You can size and place the logo graphically on the video, or you can directly edit the top/left/height/width boxes. Use the Size 1X button to snap the logo to its original size. The Colors… button brings up a dialog to enable color keying, select the key color, and set the transparency of the logo.

The Size menu allows you to select full or half-size video. The Device menu displays a list of enabled devices and provides access to the selected device's property pages. LogoApp sets the same logo spec for both the Capture and Preview pin. If SimulStream is enabled, LogoApp will set only Pin Pair 0. To set up other pin instances, or to set the capture and preview pins differently, use the driver's Logo property page.

APPENDIX A

Osprey Hardware Specifications

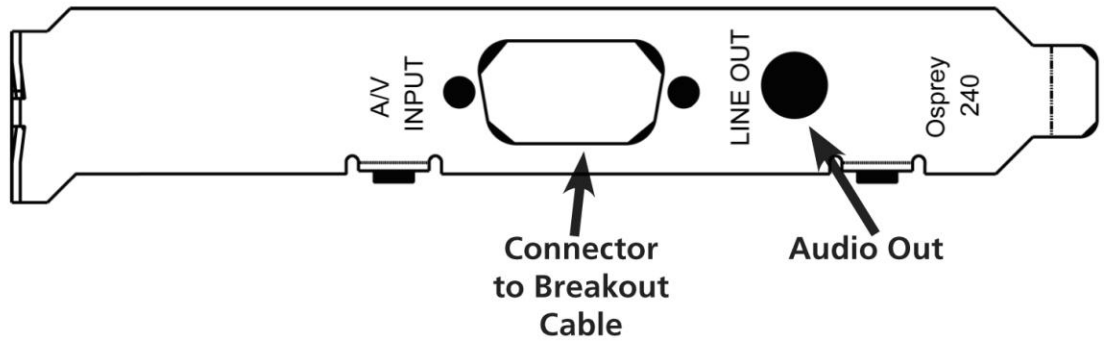
Environmental Specifications

Operating Temperature Range	0° to 40° C
Non-operating Temperature Range	-40° to +75° C (RH)
Operating Humidity Range	Between 5% and 80% (non-condensing) @ 40° C
Non-operating Humidity Range	95% RH (non-condensing); gradient 30% per hour
Operating Altitude Range	0 to 3,048 meters (10,000 feet)
Non-operating Altitude Range	0 to 15,240 meters (50,000 feet)

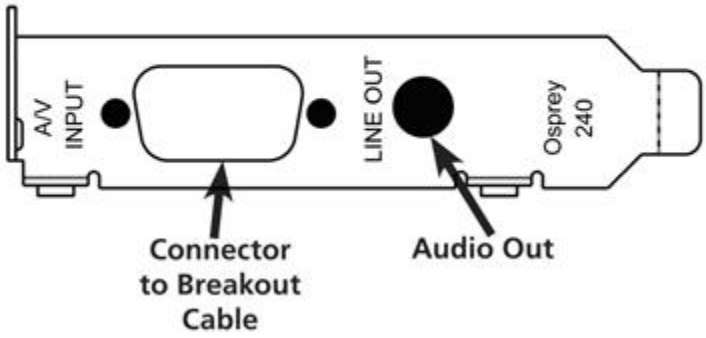
PCI Express Bus Compliant

Approximate card weight is 85 grams

Osprey-240e Long Backplate



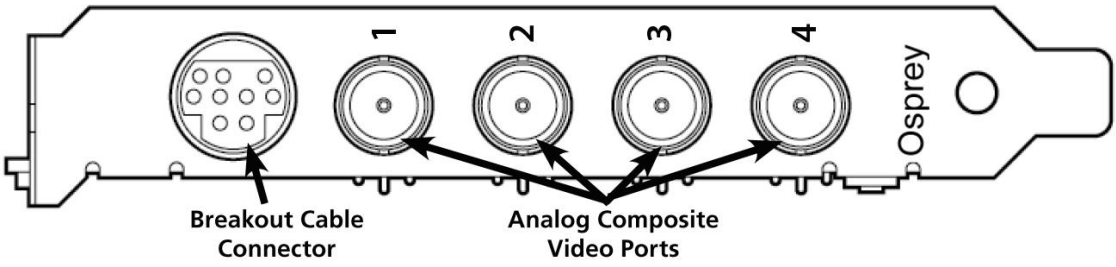
Osprey-240e Short Backplate



PCI Express Bus Compliant

Approximate card weight is 198 grams

Osprey-450e Backplate

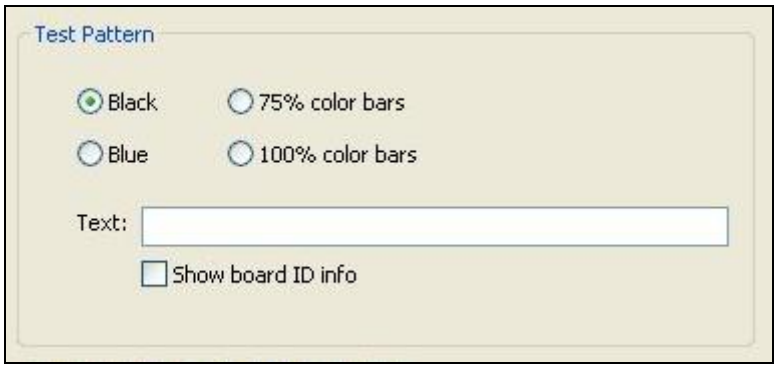


Appendix B Troubleshooting

Color Bars on Video Screen

The Osprey-240e/450e AVSstream Driver has a "built-in" Color Bar generator. If color bars appear in your video preview window, it is an indication that video is not present on the selected video input.

The color bar display can be adjusted or changed in the Device Properties tab, including the text overlay on the screen.



To solve this problem, check the following:

Check that the camera, VCR, or other video source is powered and that its output is connected to the Osprey card's input.

Check that the correct video input is selected in the Control Dialog's Source page.

Scrambled Video Image

You may have set the wrong video signal format for the signal input you are using. For example, you may have told the driver to look for NTSC-M video but are using a PAL-BDGHI video source. Make sure you know what signal format your video source is generating. Go into the Video Standard field of the Control Dialog's Source page, and click the button for that signal format.

Poor Video Quality at Large Frame Sizes

Large frame sizes with the deep pixel depth (24- or 32-bit), or complex format (YVU9 or YUV12 planar), impose heavy demands on the PCI bus's data transfer capacity. Our experience is that some systems cannot handle these formats at full frame sizes.

Systems vary in their data transfer limits. The characteristics of the PCI bridge are often more important than processor speed.

If you are having problems, we recommend that you:

Use a smaller frame size (480x320 or less).

Use a shallower color format (RGB15 or RGB24 instead of RGB32).

Try a YUV format instead of an RGB format, and a packed format instead of a planar format.

If you have a choice of PCs for video capture, try using another system with a different system board chipset.

Multiple Horizontal Lines Across Video Image

If there are multiple, regularly spaced, horizontal lines across your video image and your source material is copyrighted and copy-protected, you are seeing Macrovision™ copy protection.

The lines can vary in color from yellow to blue to green. These lines are not present in every frame of video. There may also be a black band at the top of the frame.

There are other brands of copy-protection besides Macrovision. Some of these employ similar methods (resulting in the above) and others do not. This is a good example of Macrovision effects but you should find a good way if possible to briefly note that there are other forms of copy protection and that they may have different effects on the picture.

Cannot Play Back Recorded Audio

If you have a sound card installed, you should be able to hear audio when you play back recorded audio.

Verify that the volume control for your playback device is not muted.

Verify that the selected playback device is your sound card. Some Windows applications cannot use a recording device unless a playback device is also installed. The Placeholder device cannot play back recorded audio. You can use the same method to select playback device that you use when selecting the audio source.

Audio Recording Control Comes Up With Wrong Device and Wrong Inputs

The cause of this problem may be that you currently have or have had previously, a Video for Windows audio capture driver installed in the system. The Osprey AVStream install process normally removes a previous Video for Windows driver, but if you have multiple Osprey cards installed you do have the option of running the Video for Windows driver on some cards and the AVStream driver on others. Unfortunately the Recording Control does not work smoothly in this situation. The Video for Windows device will always try to act like it is the selected device even if it is not. You have to manually enter Recording Control's Options -> Properties dialog to select your device.

If you no longer have need for the Video for Windows driver, you can uninstall it using instructions obtainable from Osprey technical support. If you are comfortable using RegEdit to edit your registry, you can instead go to the following location:

HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Drivers32